



South Coast Water District

Final

2010 Urban Water Management Plan

July 2011



**MALCOLM
PIRNIE**

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The Water Division of ARCADIS

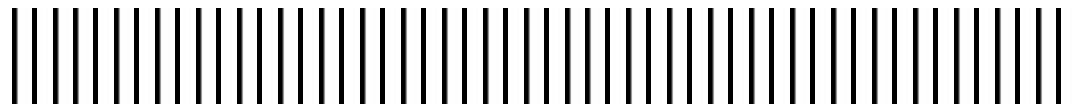


South Coast Water District

31592 West Street • Laguna Beach, CA 92651

2010 Urban Water Management Plan

July 2011



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Acronyms Used in the Report

| | |
|---------|---|
| 20x2020 | 20% water use reduction in GPCD by year 2020 |
| Act | Urban Water Management Planning Act |
| AFY | acre-feet per year |
| AMP | Allen McCulloch Pipeline |
| AMR | Automatic Meter Reading |
| APWA | American Public Works Association |
| ATM | Aufdenkamp Transmission Main |
| AWT | Advanced Wastewater Treatment |
| BDCP | Bay Delta Conservation Plan |
| BMP | Best Management Practice |
| Board | Metropolitan's Board of Directors |
| CALFED | CALFED Bay-Delta Program |
| CBWD | Capistrano Beach Water District |
| CDR | Center for Demographic Research |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CII | Commercial/Industrial/Institutional |
| CIMIS | California Irrigation Management Information System |
| CMWD | Coastal Municipal Water District |
| COG | council of governments |
| CRA | Colorado River Aqueduct |
| CTP | Coastal Treatment Plant |
| CUWCC | California Urban Water Conservation Council |
| DMM | Demand Management Measure |
| DWR | Department of Water Resources |
| EIR | Environmental Impact Report |
| EOCF #2 | East Orange County Feeder #2 |
| ETo | Evapotranspiration |
| FY | Fiscal Year |
| FYE | Fiscal Year Ending |
| GAP | Green Acres Project |
| GMFP | Groundwater Management Facility Plan |
| GPCD | gallons per capita per day |
| gpm | gallons per minute |
| GRF | Groundwater Recovery Facility |
| HECW | High Efficiency Clothes Washer |
| HET | high efficiency toilet |
| HOA | Homeowners Association |
| IRP | Integrated Water Resources Plan |

| | |
|--------------|--|
| IWA | International Water Association |
| JTM | Joint Transmission Main |
| JWRSS | Joint Regional Water Supply System |
| LOI | Letter of Intent |
| LPCP | Landscape Performance Certification Program |
| Metropolitan | Metropolitan Water District of Southern California |
| MG | million gallons |
| MGD | million gallons per day |
| MNWD | Moulton Niguel Water District |
| MOU | Memorandum of Understanding |
| MWDOC | Municipal Water District of Orange County |
| NDMA | N-nitrosodimethylamine |
| NOAA | National Oceanic and Atmospheric Administration |
| Poseidon | Poseidon Resources LLC |
| PPCP | Pharmaceuticals and Personal Care Product |
| QSA | Quantification Settlement Agreement |
| RHNA | Regional Housing Needs Plan |
| RUWMP | Regional Urban Water Management Plan |
| SBx7-7 | Senate Bill 7 as part of the Seventh Extraordinary Session |
| SCAB | South Coast Air Basin |
| SCADA | Supervisory Control and Data Acquisition |
| SCAG | Southern California Association of Governments |
| SCP | South County Pipeline |
| SCWD | South Coast Water District |
| SDCWA | San Diego County Water Authority |
| SJBA | San Juan Basin Authority |
| SOCIRWMP | South Orange County Integrated Regional Watersheds Management Plan |
| SOCWA | South Orange County Wastewater Authority |
| SWP | State Water Project |
| SWRCB | State Water Resources Control Board |
| TCMWD | Tri-Cities Municipal Water District |
| TDS | Total Dissolved Solids |
| ULFT | ultra-low-flush toilet |
| USBR | United States Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WACO | Water Advisory Committee of Orange County |
| WEROC | Water Emergency Response Organization of Orange County |
| WIP | Water Importation Pipeline |
| WOCWBF #2 | West Orange County Water Board Feeder #2 |
| WSAP | Water Supply Allocation Plan |
| WSDM | Water Surplus and Drought Management Plan |

Executive Summary

This report serves as the 2010 update of South Coast Water District's (SCWD) Urban Water Management Plan (UWMP). The UWMP has been prepared consistent with the requirements under Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Chapter 1009, and became effective on January 1, 1984. The Act requires "every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually" to prepare, adopt, and file an UWMP with the California Department of Water Resources (DWR) every five years. 2010 UWMP updates are due to DWR by August 1, 2011.

Since its passage in 1983, several amendments have been added to the Act. The most recent changes affecting the 2010 UWMP include Senate Bill 7 as part of the Seventh Extraordinary Session (SBx7-7) and SB 1087. Water Conservation Act of 2009 or SBx7-7 enacted in 2009 is the water conservation component of the Delta package. It stemmed from the Governor's goal to achieve a 20% statewide reduction in per capita water use by 2020 (20x2020). SBx7-7 requires each urban retail water supplier to develop urban water use targets to help meet the 20% goal by 2020 and an interim 10% goal by 2015.

Service Area and Facilities

SCWD provides water to a population of 38,641 throughout its 8.3 square mile service area. SCWD receives its water from two main sources, the San Juan Basin, which is managed by the San Juan Basin Authority (SJBA) and imported water from the Municipal Water District of Orange County (MWDOC). Approximately 20% of SCWD's water supply comes from a single well of its Groundwater Recovery Facility along with recycled water that is treated at the Coastal Treatment Plant. Imported water is treated at the Diemer Filtration Plant and is delivered to SCWD through two imported water connections as well as the Joint Regional Water Supply System (JRWS) which operated, maintained, and administered by SCWD.

Water Demand

Currently, the total water demand for retail customers served by SCWD is approximately 7,000 acre-feet annually consisting of 5,500 acre-feet of imported water, 624 acre-feet of local groundwater, and 790 acre-feet of recycled water. SCWD is projecting a 25% increase in demand in the next 25 years accompanying a projected 7% population growth.

With MWDOC's assistance, SCWD has selected to comply with **Option 1** of the SBx7-7 compliance options. SCWD is a member of the Orange County 20x2020 Regional

Alliance formed by MWDOC. This regional alliance consists of 29 retail agencies in Orange County. Under Compliance Option 1, SCWD's 2015 interim water use target is 167.7 GPCD and the 2020 final water use target is **149.1 GPCD**.

Water Sources and Supply Reliability

SCWD's main sources of water supply are a combination of imported water, local groundwater, and recycled water. Today, SCWD relies on 9% local groundwater, 11% recycled water, and 80% imported water. It is projected that through 2035, local groundwater will increase to 23%, recycled water will increase to 16%, and imported water will decrease to 61% of the total water supply. The sources of imported water supplies include the Colorado River and the State Water Project (SWP). Metropolitan's 2010 Integrated Water Resources Plan (IRP) update describes the core water resource strategy that will be used to meet full-service demands (non-interruptible agricultural and replenishment supplies) at the retail level under all foreseeable hydrologic conditions from 2015 through 2035.

It is required that every urban water supplier assess the reliability to provide water service to its customers under normal, dry, and multiple dry water years. Metropolitan's 2010 RUWMP finds that Metropolitan is able to meet full service demands of its member agencies with existing supplies from 2015 through 2035 during normal years, single dry year, and multiple dry years. SCWD is therefore capable of meeting the water demands of its customers in normal, single dry, and multiple dry years between 2015 and 2035, as illustrated in Table 3-13, Table 3-14, and Table 3-15, respectively.

Future Water Supply Projects

SCWD has conducted a preliminary investigation of a project to intercept and treat a portion of the urban runoff in lower Aliso Creek to supplement the recycled water system. Treatment would include filtration and reverse osmosis facilities near the Coastal Treatment Plant. The plant would produce up to 0.5 MGD of low TDS water. This project could provide up to 300 AFY of additional recycled water. SCWD is investigating other sources of recycled water to meet the ultimate projection of 1,400 AFY.

SCWD currently owns and operates a Groundwater Recovery Facility with a capacity of 1 MGD that removes iron and manganese using Reverse Osmosis. SCWD plans to expand the GRF along with a new well to allow SCWD to draw on the Groundwater basin from a second location, as well as the construction of additional wells to reach the 2,000 AFY goals.

Santa Margarita Water District is constructing the Upper Chiquita Reservoir with a capacity of 244 MG (750 AF), near Oso Parkway and the 241 Toll Road. SCWD requested to allocate 13.2 MG (49 AF) of the reservoir's capacity for additional

operational use. The reservoir began construction in June 2009 and is anticipated to be completed in early 2011.

In Orange County, there are three proposed ocean desalination projects that could serve MWDOC, including two that specifically may benefit SCWD. These are the Huntington Beach Seawater Desalination Project, and the South Orange Coastal Desalination Project. On July 28, 2009, SCWD signed a non-binding LOI for 2.7 MGD (3,000 AFY) of the Huntington Beach Seawater Desalination Project supplies. SCWD is also working in joint with MWDOC and four other South County water agencies along with Metropolitan on the South Orange Coastal Desalination Project; SCWD's preliminary project water supply is 3 MGD (3,360 AFY).

1. Introduction

1.1. Urban Water Management Plan Requirements

Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act) require “every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually” to prepare, adopt, and file an UWMP with the California Department of Water Resources (DWR) every five years. 2010 UWMP updates are due to DWR by August 1, 2011.

This UWMP provides DWR with information on the present and future water resources and demands and provides an assessment of SCWD’s water resource needs. Specifically, this document will provide water supply planning for a 25-year planning period in 5-year increments. The plan will also identify water supplies for existing and future demands, quantify water demands during normal year, single-dry year, and multiple-dry years, and identify supply reliability under the three hydrologic conditions. SCWD’s 2010 UWMP update revises the 2005 UWMP. This document has been prepared in compliance with the requirements of the Act as amended in 2009, and includes the following analysis:

- Water Service Area and Facilities
- Water Sources and Supplies
- Water Use by Customer Type
- Demand Management Measures
- Water Supply Reliability
- Planned Water Supply Projects and Programs
- Water Shortage Contingency Plan
- Recycled Water

Since its passage in 1983, several amendments have been added to the Act. The most recent changes affecting the 2010 UWMP include Senate Bill 7 as part of the Seventh Extraordinary Session (SBx7-7) and SB 1087. Water Conservation Act of 2009 or SBx7-7 enacted in 2009 is the water conservation component of the historic Delta package. It stemmed from the Governor’s goal to achieve a 20% statewide reduction in per capita water use by 2020 (20x2020). SBx7-7 requires each urban retail water supplier to develop urban water use targets to help meet the 20% goal by 2020 and the interim 10% goal by 2015. Each urban retail water supplier must include in its 2010 UWMPs the following information from its target-setting process:

- Baseline daily per capita water use
- 2020 Urban water use target
- 2015 Interim water use target
- Compliance method being used along with calculation method and support data

Wholesale water suppliers are required to include an assessment of present and proposed future measures, programs, and policies that would help achieve the 20 by 2020 goal.

The other recent amendment made to the UWMP Act to be included in the 2010 UWMP is set forth by SB 1087, Water and Sewer Service Priority for Housing Affordable to Low-Income Households. SB 1087 requires water and sewer providers to grant priority for service allocations to proposed developments that include low income housing. SB 1087 also requires UWMPs to include projected water use for single- and multi-family housing needed for low-income households.

The sections in this UWMP correspond to the outline of the Act, specifically Article 2, Contents of Plans, Sections 10631, 10632, and 10633. The sequence used for the required information, however, differs slightly in order to present information in a manner reflecting the unique characteristics of SCWD's water utility. The UWMP Checklist has been completed, which identifies the location of Act requirements in this Plan and is included as Appendix A.

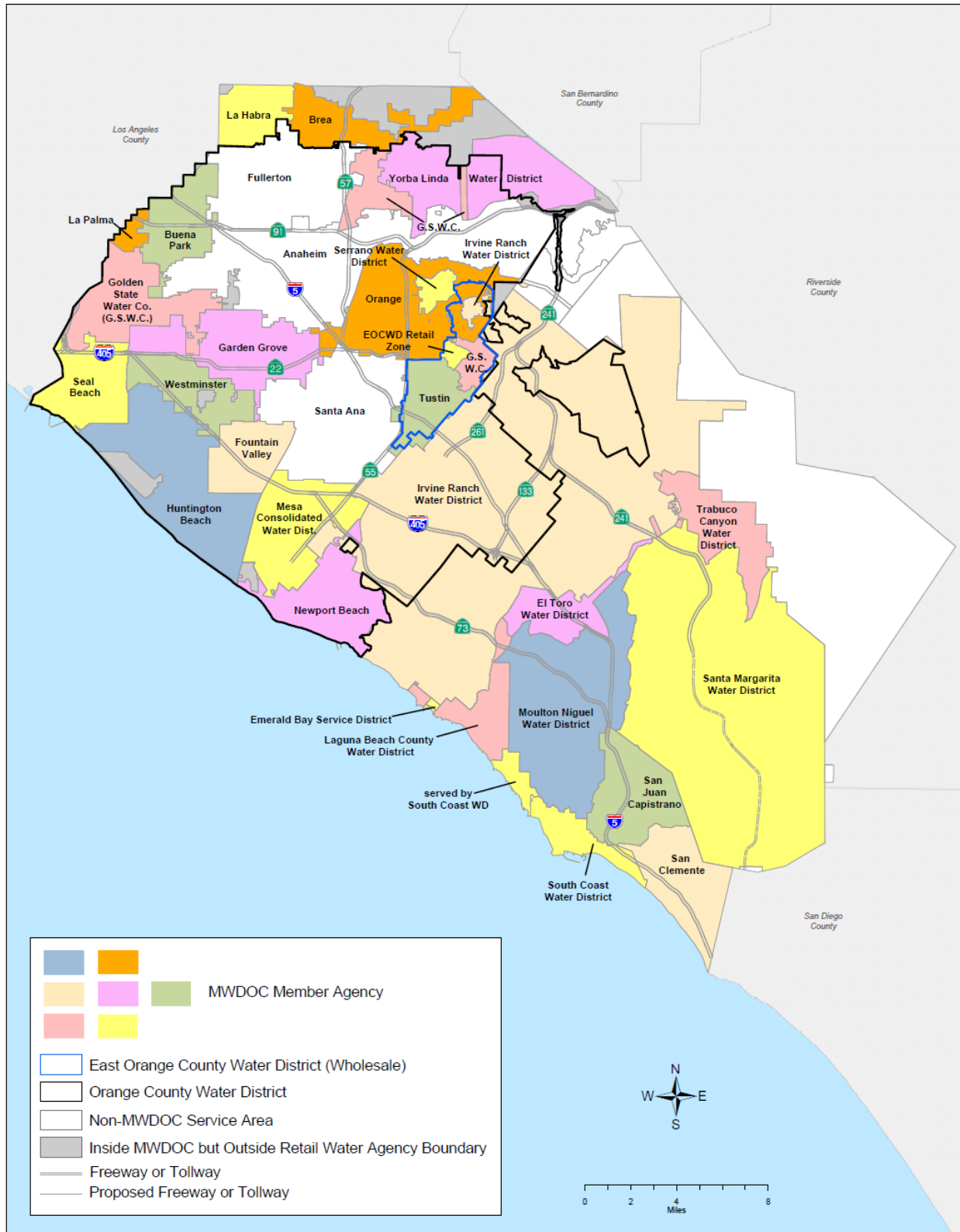


Figure 1-1: Regional Location of Urban Water Supplier

1.2. Agency Overview

SCWD is a public agency, formed by popular vote and owned by the people it serves. SCWD is a special district, operating under state law, completely independent of county government. SCWD provides the core services of potable water production and distribution, recycled water distribution, and wastewater collection to a total population of nearly 39,000 residents, as well as hundreds of thousands of visitors each year.

A five-member Board of Directors, elected by the voters of SCWD, has the power to establish policies, fix rates, construct and maintain facilities and perform any other act necessary to provide water and sanitation service for present and future consumers. Day-to-day operations are administered by a general manager who is appointed by the Board of Directors. The current members of the Board of Directors are:

- Wayne Rayfield - President
- Ingrid McGuire - Vice President
- Richard Gardner
- Robert Moore
- Richard Runge

SCWD was formed in 1932 to serve water to the area known as South Laguna. In 1942 SCWD, through the newly formed Coastal Municipal Water District (CMWD), started to receive water from Metropolitan Water District of Southern California (Metropolitan).

In 1976 SCWD merged with the South Laguna Sanitary District, whose service area was wholly within the boundaries of SCWD. SCWD was then able to provide water distribution, sanitary collection and sanitary treatment services to its constituents.

Water recycling became part of SCWD's operation in 1982. The original system consisted of an Advanced Wastewater Treatment Plant (AWT) located at the Coastal Treatment Plant for production and a distribution system comprised of 3 reservoirs, 3 pump stations, and necessary distribution pipelines.

On January 1, 1988, the City of Laguna Beach extended its boundaries southeasterly within a portion of SCWD and annexed approximately 1,220 acres to SCWD. The following year the City of Dana Point was formed. A portion of this City covers some 1,800 acres northwesterly within SCWD. A small portion of San Clemente covers some 200 acres within SCWD. On July 1, 1997 approximately 180 acres (approximately 400 service connections) served by SCWD within the city limits of Laguna Niguel were detached from SCWD and annexed into the Moulton Niguel Water District (MNWD). This was done at the request of the residents of the affected area.

On January 1, 1999 SCWD, Dana Point Sanitary District, and the Capistrano Beach Water District (CBWD) which was organized as a county water district on October 11, 1948 were all consolidated to become SCWD, approximately doubling the size of the original SCWD. On July 1, 1999 the water and sanitary service of SCWD (that was within the city limits of the City of Laguna Beach) was detached from SCWD and annexed into the City of Laguna Beach. Water and sanitary facilities including approximately 2145 water service connections within this area were then contracted back to SCWD for operation and maintenance. For the purpose of this plan data on this area is integrated into the overall SCWD Urban Water Management Plan. Even though the facilities in this area are operated on a contractual basis, they are integral to the overall operation of SCWD water and sanitary operations.

On April 1, 2000 a further consolidation occurred between CMWD and Tri-Cities Municipal Water District (TCMWD). This consolidation also involved the Municipal Water District of Orange County (MWDOC). MWDOC (on January 1, 2001) became the administrative agency with SCWD being the contract operator of the former TCMWD system. TCMWD employees became employees of SCWD. The transmission system serving the southernmost part of Orange County and a small part of northwestern San Diego County, was renamed the Joint Regional Water Supply System (JRWS).

SCWD receives its water from two main sources, the San Juan basin, which is managed by the San Juan Basin Authority (SJBA) and imported water from the Municipal Water District of Orange County (MWDOC). MWDOC is Orange County's wholesale supplier and is a member agency of the Metropolitan Water District of Southern California (Metropolitan).

1.3. Service Area and Facilities

1.3.1. SCWD's Service Area

SCWD is situated in Orange County, approximately 60 miles south of Los Angeles and encompassing an area of approximately 5,300 acres, along the southern coastline of Orange County. The topography consists of a fertile valley and rolling hills in the southern half, with steeply sloping hills and finger like canyons in the northeast portion of the service area. Three creeks, Aliso, Salt and San Juan, bisect SCWD providing drainage of inland watersheds. Surface elevations range from sea level to approximately 690-feet above sea level.

The SCWD provides domestic and non-domestic water service to residential, commercial and institutional customers within the City of Dana Point and City of Laguna Beach. A small portion of San Clemente covers some 200-acres within SCWD. SCWD encompasses an area of approximately 8.3 square miles (5,300 acres) for water service along the Southern California coastline of Orange County. The general vicinity of SCWD and its boundaries are shown in Figure 1-2.



Figure 1-2: South Coast Water District's Service Area

1.3.2. SCWD's Water Facilities

SCWD is 80 percent dependent on imported water, and the remaining 20 percent of its demand comes from its 1 MGD Groundwater Recovery Facility (GRF) and recycled water. Since 2000, SCWD has operated, maintained, and administered the JRWSS that distributes imported drinking water from Metropolitan throughout South Orange County. The system includes 30 miles of transmission mains and two reservoirs in San Clemente that hold a total of 60 million gallons of water. The JRWSS is jointly owned by and provides water to SCWD, Irvine Ranch Water District, El Toro Water District, Moulton Niguel Water District, the City of San Juan Capistrano, the City of San Clemente and three agencies of the San Diego County Water Authority (SDCWA): San Onofre Nuclear Generating Station, Camp Pendleton, and San Onofre State Park.

SCWD also manages a unique sewer tunnel and main in South Laguna, which transports an average of 850,000 gallons of wastewater a day from Dana Point to the Coastal Treatment Plant located to the east of Laguna Beach in unincorporated County land (Aliso and Wood Canyons Wilderness Park).

2. Water Demand

2.1. Overview

Currently, the total water demand for retail customers served by SCWD is approximately 7,000 acre-feet annually consisting of 5,500 acre-feet of imported water, 634 acre-feet of local groundwater, and 790 acre-feet of recycled water. SCWD is projecting a 25% increase in demand for the next 25 years.

The passage of SBx7-7 will increase efforts to reduce the use of potable supplies in the future. This new law requires all of California's retail urban water suppliers serving more than 3,000 AFY or 3,000 service connections to achieve a 20% reduction in potable water demands (from a historical baseline) by 2020. Due to great water conservation efforts in the past decade, SCWD is on its way to meeting this requirement on its own. Moreover, SCWD has elected to join the Orange County 20x2020 Regional Alliance. SCWD together with other 28 retail agencies in Orange County are committed to reduce the region's water demand by 2020 through the leadership of MWDOC, the region's wholesale provider.

This section will explore in detail SCWD's current water demands by customer type and the factors which influence those demands as well as providing a perspective of its expected future water demands for the next 25 years. In addition, to satisfy SBx7-7 requirements, this section will provide details of SCWD's SBx7-7 compliance method selection, baseline water use calculation, and its 2015 and 2020 water use targets.

2.2. Factors Affecting Demand

Water consumption is influenced by many factors from climate characteristics of that hydrologic region, to demographics, land use characteristics, and economics. The key factors affecting water demand in SCWD's service area is discussed below.

2.2.1. Climate Characteristics

SCWD is located in an area known as the South Coast Air Basin (SCAB). The SCAB climate is characterized by southern California's "Mediterranean" climate: a semi-arid environment with mild winters, warm summers and moderate rainfall. The general region lies in the semi-permanent, high pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. The usually mild climatologically pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds.

SCWD's average temperature ranges from 55 degrees Fahrenheit in January to 73 degrees Fahrenheit in August with an average annual temperature of 63 degrees. Annual precipitation is typically approximately 14 inches, occurring mostly between November and March (Table 2-1). The average evapotranspiration (ET_o) is almost 50 inches per year, which is four times the annual average rainfall. This translates to a high demand for landscape irrigation for homes, commercial properties, parks, and golf courses. Moreover, a region with low rainfall like Southern California is also more prone to droughts.

Table 2-1: Climate Characteristics

| | Standard Monthly Average ET_o (inches) [1] | Annual Rainfall (inches) [2] | Average Temperature (°F) [3] |
|---------------|---|---|---|
| Jan | 2.18 | 2.96 | 54.5 |
| Feb | 2.49 | 3.07 | 55.9 |
| Mar | 3.67 | 2.97 | 57.3 |
| Apr | 4.71 | 0.77 | 60.9 |
| May | 5.18 | 0.28 | 64.2 |
| Jun | 5.87 | 0.10 | 68.1 |
| Jul | 6.29 | 0.01 | 72.1 |
| Aug | 6.17 | 0.14 | 73.1 |
| Sep | 4.57 | 0.34 | 71.4 |
| Oct | 3.66 | 0.40 | 66.1 |
| Nov | 2.59 | 1.22 | 59.1 |
| Dec | 2.25 | 1.79 | 54.3 |
| Annual | 49.63 | 13.87 | 63.1 |

[1] CIMIS Station #75, Irvine, California from October 1987 to Present

[2] NOAA, Tustin Irvine Ranch, California 1971 to 2000, Mean Precipitation Total

[3] NOAA, Tustin Irvine Ranch, California 1971 to 2000, Mean Temperature

The source of SCWD's imported water supplies, the State Water Project (SWP) and Colorado River Project, is influenced by weather conditions in Northern California and along the Colorado River. Both regions have recently been suffering from multi-year drought conditions and record low rainfalls which directly impact demands and supplies to Southern California.

2.2.2. Demographics

SCWD serves an estimated population of about 38,600 people within the City of Dana Point and City of Laguna Beach, and is growing slowly, as there is little remaining vacant land. The Center for Demographic Research (CDR) at California State University

Fullerton projects a 7% increase in SCWD's population over the next 25 years. This represents an average growth rate of 0.28% per year. Only minimal changes in land use are anticipated over the next 25 years because the service area is essentially built-out. Table 2-2 shows the population projections in five-year increments to the year 2035.

Table 2-2: Population – Current and Projected

| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035-opt |
|-----------------------------|--------|--------|--------|--------|--------|----------|
| Service Area Population [1] | 38,641 | 39,219 | 39,798 | 40,376 | 40,955 | 41,533 |

[1] Center for Demographic Research, California State University, Fullerton 2010

Other demographic factors that also play a role in influencing demands include recreation and tourism which is an important industry in SCWD. Tourism affects seasonal demands with higher demands in the summer especially at beach facilities as well as hotels and restaurants.

2.2.3. Land Use

The general character of land use within SCWD is mostly residential. Commercial development consists of many hotels and small businesses consistent with a community that is rapidly becoming a destination resort community. Hotels range in size from small bed and breakfast and time-shares to large four and five star luxury resorts. This emphasis on tourism does create a significant population shift during the summer tourist season. There are insignificant numbers of industrial and manufacturing accounts within SCWD. Housing, within the service area, is primarily single unit dwellings in the middle to upper price range with several gate-guarded communities. Some of these communities have converted their irrigation demands to recycled water within the common areas. SCWD's most densely populated area is within the central portion of the City of Dana Point that consists of multi-unit apartment and condominium dwellings.

Included within SCWD are two golf courses, four schools, a 170-bed hospital, five small shopping centers two 400 room five star hotel complexes, the Ritz Carlton and Saint Regis Resorts, a 376 room Laguna Cliffs Marriott Resort along with an additional 280 room five star hotel complex the Montage. With the construction of the luxury hotels, championship golf course and miles of ocean beaches, the area has become a popular destination resort with substantial population variations, especially during the summer months. The majority of the commercial development is located in the central Dana Point and Capistrano Beach areas.

Within the SCWD service area of Laguna Beach, the City has informed SCWD that the Aliso Creek Inn and Golf Course will be redeveloped in the near future. It is estimated that this development will add 40-50 condominium units and 90-98 hotel rooms, a

restaurant and spa in the place of the existing 64-room inn. The 9-hole golf course would be redesigned but will remain 9 holes. In addition there could be approximately 11-15 single family residences constructed on an adjacent parcel. It is anticipated that the permitting process through construction could take approximately 5 years.

The Dana Point Harbor is within the SCWD service area. It is a 277- acre small craft harbor owned and operated by the County of Orange. Amenities within the harbor include a 136-room three star hotel known as the Marina Inn; the site is currently under consideration for potential replacement and/or remodeling of the hotel complex to include conference and recreational facilities in addition to providing up to 220 new guest rooms and amenities. The harbor has over 2,400 small-craft slips, as well as 75,000 square feet of existing restaurant, retail, and other commercial uses. The County is under taking a major revitalization of the harbor in the next couple of years that will result in 80,000 square feet of new restaurant and retail space and renovation of 30,000 square feet of existing restaurant and retail space.

The Dana Point Headlands property is currently under development. However, it is anticipated from the water and sewer master planning projections that upon completion, 118 residential units will be built on the property along with a 90-room resort hotel, to include restaurants and commercial space.

The Downtown core area of the City of Dana Point has been identified for revitalization. The Town Center District calls for a mix retail businesses offering goods and services for residents and visitors. At total build out, under moderate intensity mixed use assumptions approximately 526,508 square feet (sq. ft.) of businesses will be located on the ground floors of the buildings while upper floors will contain an additional 286, 126 sq. ft of offices and 317 residential units.

2.3. Water Use by Customer Type

The knowledge of an agency's water consumption by type of use or by customer class is key to developing that agency's water use profile which identifies when, where, how, and how much water is used, and by whom within the agency's service area. A comprehensive water use profile is critical to the assessment of impacts of prior conservation efforts as well as to the development of future conservation programs.

This section provides an overview of SCWD's water consumption by customer type in 2005 and 2010, as well as projections for 2015 to 2035. The customer classes are categorized as follows: single-family residential, multi-family residential, commercial/industrial/institutional (CII), dedicated landscape, and agriculture. Other water uses including sales to other agencies and non-revenue water are also discussed in this section.

2.3.1. Overview

SCWD has approximately 12,400 customer connections to its water distribution system. SCWD is expected to add 500 more connections by 2035. Approximately 63% of the SCWD's water demand is residential. CII including dedicated landscape consume approximately 37% of SCWD's water supply. All connections in SCWD's service area are metered and have been converted to Automatic Meter Reading (AMR). SCWD has also gone to monthly billing.

Tables 2-3 and 2-4 provide a summary of past, current, and projected number of water service customers and water use by customer class in five-year increments from 2005 through to 2035.

Table 2-3: Past, Current and Projected Service Accounts by Water Use Sector

| Fiscal Year Ending | Number of Accounts by Water Use Sector | | | | | |
|--------------------|--|--------------|-----|-----------|-------|----------------|
| | Single Family | Multi-Family | CII | Landscape | Other | Total Accounts |
| 2005 | 9,501 | 1,489 | 499 | 529 | 149 | 12,167 |
| 2010 | 9,595 | 1,560 | 521 | 540 | 153 | 12,369 |
| 2015 | 9,626 | 1,600 | 531 | 550 | 155 | 12,462 |
| 2020 | 9,657 | 1,719 | 551 | 570 | 160 | 12,657 |
| 2025 | 9,688 | 1,798 | 561 | 585 | 160 | 12,792 |
| 2030 | 9,719 | 1,877 | 561 | 590 | 160 | 12,907 |
| 2035 | 9,719 | 1,877 | 561 | 590 | 160 | 12,907 |

Table 2-4: Past, Current and Projected Water Demand by Water Use Sector

| Fiscal Year Ending | Water Demand by Water Use Sectors (AFY) | | | | | |
|--------------------|---|--------------|-------|-----------|-------|--------------|
| | Single Family | Multi-Family | CII | Landscape | Other | Total Demand |
| 2005 | 3,439 | 1,364 | 1,151 | 1,668 | 61 | 7,683 |
| 2010 | 3,077 | 1,147 | 960 | 1,791 | 16 | 6,991 |
| 2015 | 3,390 | 1,350 | 1,160 | 2,290 | 18 | 8,208 |
| 2020 | 3,455 | 1,450 | 1,170 | 2,400 | 20 | 8,495 |
| 2025 | 3,485 | 1,500 | 1,180 | 2,420 | 20 | 8,605 |
| 2030 | 3,511 | 1,545 | 1,180 | 2,480 | 20 | 8,736 |
| 2035 | 3,511 | 1,545 | 1,180 | 2,480 | 20 | 8,736 |

2.3.2. Residential

Residential water use accounts for the majority of SCWD's water demands. The single family residential sector accounts for approximately 45% and multi-family residential

accounts for 18% of the total water demand. Water consumption by the residential sector is projected to remain at about 60% through the 25-year planning horizon.

2.3.3. Non-Residential

In 2010 non-residential demand was about 40% of the overall demand and is expected to remain so through 2035. SCWD has a mix of commercial uses (markets, restaurants, etc.), public entities (such as schools, fire stations and government offices), office complexes, light industrial, warehouses and facilities serving the public. CII uses (excluding large landscape) represent a combined 15% of SCWD's total demand. Demands from large landscapes such as parks and golf courses are expected to remain at around 22% of SCWD's total water demands for the next 25 years. About half of the landscape demand is served by recycled water. SCWD will continue to expand the use of recycled water whenever feasible. "Other" water use sector includes Fire suppression, street cleaning, line flushing, construction meters, and temporary meters.

2.3.4. Other Water Uses

2.3.4.1. Sales to Other Agencies

SCWD does not sell water to other agencies except in case of emergencies.

2.3.4.2. Non-Revenue Water

Non-revenue water is defined by the International Water Association (IWA) as the difference between distribution systems input volume (i.e. production) and billed authorized consumption. Non-revenue water consists of three components: unbilled authorized consumption (e.g. hydrant flushing, fire fighting, and blow-off water from well start-ups), real losses (e.g. leakage in mains and service lines), and apparent losses (unauthorized consumption and metering inaccuracies).

SCWD's non-revenue water accounts for approximately 5% of SCWD's total water use and is expected to remain so (Table 2-5).

Table 2-5: Additional Water Uses and Losses (AFY)

| Water Use | Fiscal Year Ending | | | | | | |
|-------------------------------|--------------------|------------|------------|------------|------------|------------|------------|
| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| Saline Barriers | - | - | - | - | - | - | - |
| Groundwater Recharge | - | - | - | - | - | - | - |
| Conjunctive Use | - | - | - | - | - | - | - |
| Raw Water | - | - | - | - | - | - | - |
| Recycled Water | - | - | - | - | - | - | - |
| Unaccounted-for System Losses | 352 | 362 | 362 | 373 | 374 | 374 | 374 |
| Total | 352 | 362 | 362 | 373 | 374 | 374 | 374 |

2.4. SBx7-7 Requirements

2.4.1. Overview

SBx7-7, which became effective on February 3, 2010, is the water conservation component to the Delta legislative package. It seeks to implement Governor Schwarzenegger's 2008 water use reduction goals to achieve a 20% statewide reduction in urban per capita water use by December 31, 2020. As discussed above, the bill requires each urban retail water supplier to develop urban water use targets to help meet the 20% goal by 2020 and an interim 10% goal by 2015. The bill establishes methods for urban retail water suppliers to determine targets to help achieve water reduction targets. The retail water supplier must select one of the four compliance options. The retail agency may choose to comply to SBx7-7 as an individual or as a region in collaboration with other water suppliers. Under the regional compliance option, the retail water supplier still has to report the water use target for its individual service area. The bill also includes reporting requirements in the 2010, 2015, and 2020 UWMPs. An agency that does not comply with SBx7-7 requirement will not be eligible for water related grant, or loan, from the state on and after July 16, 2016. However, if an agency that is not in compliance documents a plan and obtains funding approval to come into compliance then could become eligible for grants or loans.

2.4.2. SBx7-7 Compliance Options

DWR has established four compliance options for urban retail water suppliers to choose from. Each supplier is required to adopt one of the four options to comply with SBx7-7 requirements. The four options include:

- *Option 1* requires a simple 20% reduction from the baseline by 2020 and 10 percent by 2015.
- *Option 2* employs a budget-based approach by requiring an agency to achieve a performance standard based on three metrics
 - Residential indoor water use of 55 GPCD
 - Landscape water use commensurate with Model Landscape Ordinance
 - 10% reduction in baseline CII water use
- *Option 3* is to achieve 95% of the applicable state hydrologic region target as set forth in the State's 20x2020 Water Conservation Plan.
- *Option 4* requires the subtraction of Total Savings from the Base GPCD:
 - Total Savings includes indoor residential savings, meter savings, CII savings, and landscape and water loss savings.

SCWD's Compliance Option Selection

With MWDOC's assistance in the calculation of SCWD's base daily per capita use and water use targets, SCWD has selected to comply with **Option 1**.

While each retail agency is required to choose a compliance option in 2010, DWR allows for the agency to change its compliance option in 2015. This will allow SCWD to determine its water use targets for Compliance Option 2 and 4 as it anticipates more data to be available for targets calculation in the future.

2.4.3. Regional Alliance

Retail agencies can choose to meet the SBx7-7 targets on its own or several retail agencies may form a regional alliance and meet the water use targets as a region. The benefit for an agency that joins a regional alliance is that it has multiple means of meeting compliance.

SCWD is a member of the Orange County 20x2020 Regional Alliance formed by MWDOC. This regional alliance consists of 29 retail agencies in Orange County as described in MWDOC's 2010 RUWMP. The Regional Alliance Weighted 2015 target is 174 GPCD and 2020 target is 157 GPCD.

2.4.4. Baseline Water Use

The first step to calculating an agency's water use targets is to determine its base daily per capita water use (baseline water use). This baseline water use is essentially the agency's gross water use divided by its service area population, reported in gallons per capita per day (GPCD). The baseline water use is calculated as a continuous 10-year average during a period, which ends no earlier than December 31, 2004 and no later than December 31, 2010. Agencies that recycled water made up 10 percent or more of 2008 retail water delivery can use up to a 15-year average for the calculation.

Recycled water use represented more than 10% of SCWD's retail delivery in 2008; therefore, a 15-year instead of a 10-year rolling average was calculated. SCWD's baseline water use is **186.4 GPCD** which was obtained from the 15-year period July 1, 1990 to June 30, 2005.

Tables 2-6 and 2-7 provide the base period ranges used to calculate the baseline water use for SCWD as well as the service area population and annual water use data which the base daily per capita water use was derived. Data provided in Table 2-6 was used to calculate the continuous 15-year average baseline GPCD. Moreover, regardless of the compliance method adopted by SCWD, it will need to meet the minimum water use target of 5% reduction from a five-year baseline as calculated in Table 2-7.

Table 2-6: Base Daily per Capita Water Use – 15-year range

| Highest Available Baseline [1] | | Beginning | Ending |
|--------------------------------|--|--------------|---------------|
| 15 Year Avg | | July 1, 1990 | June 30, 2005 |

| Fiscal Year Ending | Service Area Population | Gross Water Use (gallons per day) | Daily Per Capita Water Use |
|----------------------------------|-------------------------|-----------------------------------|----------------------------|
| 1991 | 32,686 | 6,873,938 | 210 |
| 1992 | 33,059 | 6,080,290 | 184 |
| 1993 | 33,402 | 6,696,908 | 200 |
| 1994 | 33,642 | 6,490,684 | 193 |
| 1995 | 33,845 | 6,533,179 | 193 |
| 1996 | 34,109 | 6,614,507 | 194 |
| 1997 | 34,465 | 6,655,931 | 193 |
| 1998 | 34,852 | 6,343,024 | 182 |
| 1999 | 35,239 | 6,441,851 | 183 |
| 2000 | 36,081 | 6,742,973 | 187 |
| 2001 | 36,540 | 6,267,231 | 172 |
| 2002 | 37,009 | 6,575,584 | 178 |
| 2003 | 37,558 | 6,518,895 | 174 |
| 2004 | 37,816 | 6,828,051 | 181 |
| 2005 | 37,908 | 6,546,838 | 173 |
| Base Daily Per Capita Water Use: | | | 186.4 |

[1] The most recent year in base period must end no earlier than December 31, 2004, and no later than December 31, 2010. The base period cannot exceed 10 years unless at least 10 percent of 2008 retail deliveries were met with recycled water.

Table 2-7: Base Daily per Capita Water Use – 5-year range

| Highest Available Baseline [2] | | Beginning | Ending |
|--------------------------------|--|--------------|---------------|
| 5 Year Avg | | July 1, 2003 | June 30, 2008 |

| Fiscal Year Ending | Service Area Population | Gross Water Use (gallons per day) | Daily Per Capita Water Use |
|----------------------------------|-------------------------|-----------------------------------|----------------------------|
| 2004 | 37,816 | 6,828,051 | 181 |
| 2005 | 37,908 | 6,546,838 | 173 |
| 2006 | 37,893 | 6,253,750 | 165 |
| 2007 | 37,925 | 6,938,930 | 183 |
| 2008 | 38,078 | 6,713,780 | 176 |
| Base Daily Per Capita Water Use: | | | 175.5 |

[2] The base period must end no earlier than December 31, 2007, and no later than December 31, 2010.

2.4.5. SBx7-7 Water Use Targets

Under Compliance Option 1, the simple 20% reduction from the baseline, SCWD's 2015 interim water use target is 167.7 GPCD and the 2020 final water use target is **149.1 GPCD** as summarized in Table 2-8.

Table 2-8: Preferred Compliance Option and Water Use Targets

| | Baseline | 2015 Target | 2020 Target |
|---------------------------------|----------|-------------|-------------|
| Option 1 - Simple 20% Reduction | 186.4 | 167.7 | 149.1 |

2.4.6. Water Use Reduction Plan

SCWD is a member agency of MWDOC and a member of the Orange County 20x2020 Regional Alliance comprising 29 retail urban water suppliers in Orange County. The Orange County 20x2020 Regional Alliance was created to allow local water suppliers to meet their 20% by 2020 reduction targets under SBx7-7 on a regional basis through the successful implementation of region-wide programs.

The Orange County 20x2020 Regional Alliance will achieve its water use reduction by building on the existing collaboration between Metropolitan, MWDOC and the local agencies in Orange County. MWDOC as a regional wholesale water provider implements many of the urban water conservation Best Management Practices (BMPs) on behalf its member agencies. MWDOC's conservation measures are detailed in MWDOC's RUWMP Section 4, and Metropolitan's conservation measures detailed in Metropolitan's 2010 RUWMP Section 3.4.

Additionally, Metropolitan in collaboration with MWDOC and other Metropolitan member agencies is in the process of developing a Long Term Conservation Plan,¹ which seeks an aggressive water use efficiency target in order to achieve a 20% reduction in per capita water use by 2020 for the entire Metropolitan service area.

Metropolitan Long Term Conservation Plan

Metropolitan's Long Term Conservation Plan will build on Metropolitan's traditional programs of incentives, education and broad outreach while developing a new vision of water use efficiency by altering the public's perspective on water through market transformation. The overarching goals of the Long Term Conservation Plan are as follows:

¹ Metropolitan Water District of Southern California Long Term Conservation Plan Working Draft Version 6 (November 30, 2010)

- Achieve the 2010 IRP conservation target – The target for new water savings through conservation is a regional per capita use of 159 gallons per day in 2015 and 141 gallons per day in 2020.
- Pursue innovation that will advance water conservation
- Transform the public’s value of water within this region – A higher value on water within this region can lead to a conservation ethic that results in permanent change in water use behavior, earlier adoption of new water saving technologies, and transition towards climate-appropriate landscapes.

Achieving these goals requires the use of integrated strategies that leverage the opportunities within this region. It requires regional collaboration and sustained support for a comprehensive, multi-year program. It requires a commitment to pursue behavioral changes and innovation in technologies that evolve the market for water efficient devices and services. It requires strategic, focused implementation approaches that build from broad-based traditional programs. It requires that research be conducted to provide the basis for decisions. Lastly, it requires the support of local leaders to communicate a new value standard for water within this region. Metropolitan and its member agencies will implement the five strategies through a traditional program, a market acceleration program, and legislation and regulation. The five strategies include:

- **Use catalysts for market transformation.** Metropolitan and member agencies will pursue market transformation to affect the market and consumer choices for water efficient devices and services.
- **Encourage action through outreach and education.** Metropolitan and member agencies will provide outreach, educational workshops, and training classes through a range of media and formats which are essential to changing public perceptions of the value of water.
- **Develop regional technical capability.** Metropolitan and member agencies will conduct research, facilitate information sharing, and/or provide technical assistance to member agencies and retail agencies to develop technical capabilities within the region for water budgeting, advanced metering infrastructure, ordinances, retail rate structures, and other conservation measures.
- **Build strategic alliances.** Metropolitan and member agencies will form strategic alliances with partners to leverage resources, opportunities and existing momentum that support market transformation.
- **Advance water efficiency standards.** Metropolitan and member agencies will work to advance water efficiency codes and standards to increase efficiency and reduce water waste.

Successful market transformation requires the integrated use of all five strategies. It is implemented through three complementary programs: traditional and market acceleration

programs, and legislation and regulation. When used together, these approaches can be catalytic and transform markets.

Traditional Program: A traditional program of incentives, outreach, education, and training will be used to provide a foundation of water savings, establish baseline conditions, provide market data, and help determine devices and services that are primed for market acceleration. Implementation may include regional incentive programs, pilot programs, regional outreach, and research for a variety of devices and services.

Market Acceleration Program: A portion of Metropolitan's resources will be used for market acceleration of devices and services that have potential for market change. Metropolitan will use a strategic focus for a specified time period to affect the market for a particular device or service. Tactics may include strategic outreach to manufacturers, retailers, contractors, and consumers; enhanced incentives; and collaboration on implementation.

Legislation and Regulation: Are important tools and often the primary means for ensuring future water savings from devices and services. Regulation, ordinances and codes establish conditions that will ensure a minimum level of water efficiency for a particular device or service in the future. Markets are dynamic, and the influences on manufactures, retailers, and consumers are constantly changing. Progress made on changing consumer preferences a market share of efficient products is protected through legislation and regulations requiring a minimum efficiency standard. This benefits both water agencies and manufactures who invest in bringing water-efficiency technologies to the market. Legislation and regulation are also effective exit strategies to discontinue traditional incentive programs so that resources can be redirected to new technologies and approaches.

Implementation of the combined programs, Traditional - Market Acceleration – Legislation and Regulation, will be closely coordinated between Metropolitan, member agencies and sub-agencies to maximize synergies. An adaptive management approach will be employed using research, implementation and evaluation to guide decisions on program activities and intensity.

Periodic Review

A periodic review of conservation actions to measure progress towards the water savings goals will be an integral component of the effort. The review will include work that is completed or in progress. It will consider factors that have affected the results as well as the opportunities to improve cost effectiveness and water savings.

2.5. Demand Projections

2.5.1. 25 Year Projections

One of the main objectives of this UWMP is to provide an insight into SCWD's future water demand outlook. As discussed above, currently, SCWD's total water demand is 6,991 acre-feet comprising of 9% local groundwater, 80% imported water, and 11% recycled water. As illustrated in Table 2-9, SCWD's water demand is expected to increase by 25% in the next 25 years. The water supply portfolio is projected to shift to more dependence on local groundwater (23%) and recycled water (16%) and less imported water from Metropolitan (61%).

Table 2-9: Current and Projected Water Demands (AFY)

| Water Supply Sources | Fiscal Year Ending | | | | | |
|--|--------------------|--------------|--------------|--------------|--------------|--------------|
| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
| MWDOC (Imported Treated/Untreated Full Service (non-int.)) | 5,567 | 5,808 | 5,295 | 5,305 | 5,336 | 5,336 |
| San Juan Basin (GRP) | 634 | 1,300 | 2,000 | 2,000 | 2,000 | 2,000 |
| Recycled Water | 790 | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |
| Total | 6,991 | 8,208 | 8,495 | 8,605 | 8,736 | 8,736 |

SCWD's 25-year demand projections for imported water shown in Table 2-10 are based on the projections provided by SCWD to MWDOC. As the regional wholesale supplier of Orange County, MWDOC works in collaboration with each of its member agencies as well as with Metropolitan, its wholesaler, to develop demand projections for imported water.

Table 2-10: SCWD's Demand Projections Provided to Wholesale Suppliers (AFY)

| Wholesales | Fiscal Year Ending | | | | |
|------------|--------------------|-------|-------|-------|----------|
| | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| MWDOC | 5,808 | 5,295 | 5,305 | 5,336 | 5,336 |

2.5.2. Low Income Household Projections

One significant change to the UWMP Act since 2005 is the requirement that retail water suppliers develop water use projections for "low-income" households at the single-family and multifamily level. These projections assist retail suppliers with compliance with Section 65589.7 of the Government Code, which requires suppliers to grant a priority for the provision of service to low income households. Consistent with this Code section, a

low-income household is defined as a household earning 80% of the County of Orange's median income or less.

In order to identify the low income housing projections within its service area, DWR² recommends that retail suppliers rely on the Regional Housing Needs Assessment (RHNA) or Regional Housing Needs Plan information developed by the local council of governments (COG), in coordination with the California Department of Housing and Community Development.

The RHNA process quantifies the need for housing by income group within each jurisdiction during specific planning period and is used in Housing Element and General Plan updates. COGs are required by the State Housing Law to determine the existing and projected regional housing needs for persons at all income levels. The RHNA is to prioritize local resource allocation and to help decide how to address existing and future housing needs.

Existing and projected housing needs for Orange County were incorporated into the Southern California Association of Governments' (SCAG) 2007 Final Regional Housing Need Allocation Plan (2007 RHNA Plan)³. This plan covers the planning period January 1, 2006 to June 30, 2014. The next RHNA process is not expected to be completed until fall of 2012; therefore, the 2007 RHNA Plan will be used for the purpose of this 2010 UWMP.

The projected water demands for low-income households in the SCWD service area was estimated by calculating the percentage of projected low income units in the service area as a percentage of the total projected units from the 2007 RHNA Plan. Given that SCWD's service area covers portions of three cities within Orange County, a weighted average of the RHNA projection for each city served by SCWD was calculated based on the proportion of sales to each city by the water district. For example, as summarized in Table 2-11, approximately 81% of SCWD's water sale is to the City of Dana Point. Based on the 2007 RHNA Plan, the projected housing need for low-income households in the City of Dana Point is 39.7% of total housing needs. Therefore, the weighted projected water demand for low-income households for the City of Dana Point is 32.16% (81% times 39.7%). The same procedure is repeated for all cities within SCWD's service area, which results in an overall projected housing need for low-income households of 39.7% as a percentage of total housing units.

² California Department of Water Resources, Guidebook to Assist Urban Water Suppliers to Prepare a 2010 UWMP, Final (March 2011)

³ Southern California Association Governments, Final Regional Housing Need Allocation Plan for Jurisdictions within the Six County SCAG Region (July 2007)

Table 2-11: Weighted Percentage of Low-income Household within SCWD's Service Area

| City | % Sales by City | % Low Income Households by City (RHNA) | Weighted % Low Income Households |
|--------------|-----------------|--|----------------------------------|
| Dana Point | 81.0% | 39.7% | 32.16% |
| San Clemente | 4.0% | 39.2% | 1.57% |
| Laguna Beach | 15.0% | 40.0% | 6.00% |
| Total | 100% | Weighted Average | 39.7% |

Table 2-12 provides a breakdown of the projected water needs for low-income single family and multifamily units. The projected water demands shown here represent 39.7% of the projected water demand by customer type for single-family and multifamily categories provided in Table 2-4 above. For example, the total multifamily residential demand is projected to be 1,350 AFY in 2015 and 1,545 AFY in 2035. The projected water demands for housing needed for multifamily low-income households are 536 and 614 AFY for 2015 and 2035, respectively.

Table 2-12: Projected Water Demands for Housing Needed for Low-income Households (AFY)

| Water Use Sector | Fiscal Year Ending | | | | |
|--|--------------------|--------------|--------------|--------------|--------------|
| | 2015 | 2020 | 2025 | 2030 | 2035 |
| Total Retail Demand | 8,208 | 8,495 | 8,605 | 8,736 | 8,736 |
| Total Residential Demand | 4,740 | 4,905 | 4,985 | 5,056 | 5,056 |
| Total Low-income Households Demand | 1,883 | 1,949 | 1,980 | 2,008 | 2,008 |
| SF Residential Demand - Total | 3,390 | 3,455 | 3,485 | 3,511 | 3,511 |
| SF Residential Demand - Low-income Households | 1,347 | 1,372 | 1,384 | 1,395 | 1,395 |
| MF Residential Demand - Total | 1,350 | 1,450 | 1,500 | 1,545 | 1,545 |
| MF Residential Demand - Low-income Households | 536 | 576 | 596 | 614 | 614 |

3. Water Sources and Supply Reliability

3.1. Overview

SCWD relies on a combination of imported water, local groundwater, and recycled water to meet its water needs. SCWD works together with two primary agencies, Metropolitan and MWDOC, to ensure a safe and high quality water supply, which will continue to serve the community in periods of drought and shortage. The sources of imported water supplies include the Colorado River and the State Water Project (SWP). Metropolitan's 2010 Integrated Water Resources Plan (IRP) update describes the core water resource strategy that will be used to meet full-service demands (non-interruptible agricultural and replenishment supplies) at the retail level under all foreseeable hydrologic conditions from 2015 through 2035. The imported water supply numbers shown here represent only the amount of supplies projected to meet demands and not the full supply capacity.

Figure 3-1 depicts SCWD's current and projected water supplies by source through 2035.

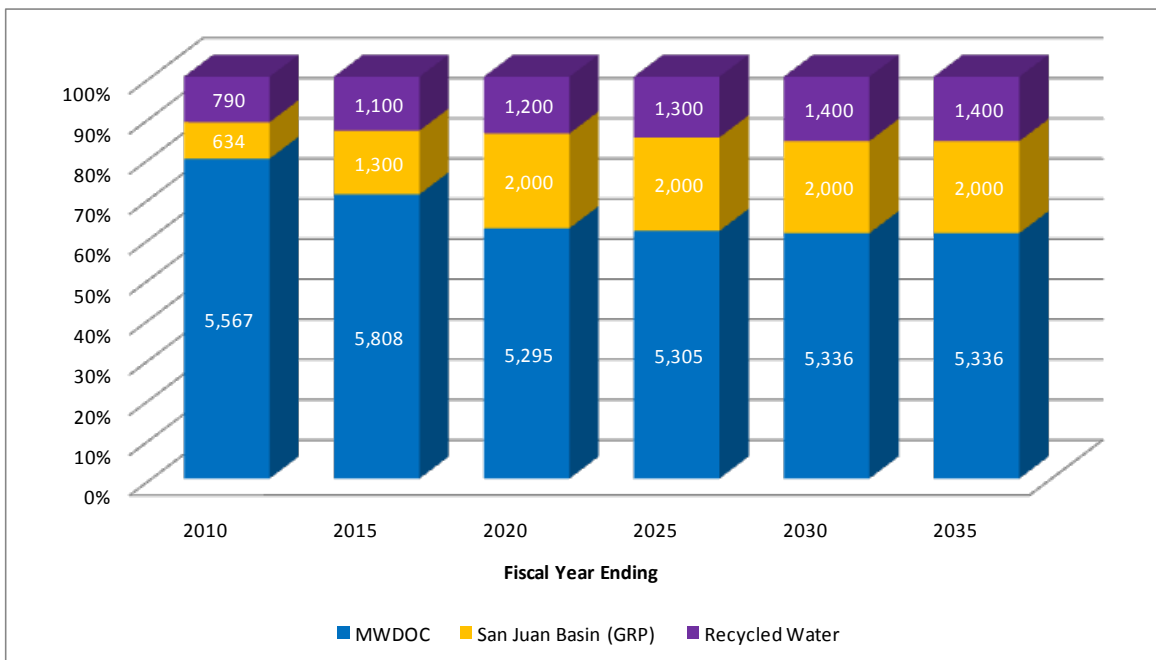


Figure 3-1: Current and Projected Water Supplies (AFY)

The following sections provide a detailed discussion of SCWD's water sources as well as projections to SCWD's future water supply portfolio for the next 25 years. Additionally,

SCWD's projected supply and demand under various hydrological conditions are compared to determine SCWD's supply reliability for the 25 year planning horizon. This section satisfies the requirements of § 10631 (b) and (c), and 10635 of the Water Code.

3.2. Imported Water

SCWD currently relies on 5,567 AFY of imported water wholesaled by Metropolitan through MWDOC to supplement local groundwater. Imported water represents approximately 80% of SCWD's total water supply. Metropolitan's principal sources of water originate from two sources - the Colorado River via the Colorado Aqueduct and the Lake Oroville watershed in Northern California through the State Water Project (SWP). This water is treated at the Robert B. Diemer Filtration Plant located north of Yorba Linda. Typically, the Diemer Filtration Plant receives a blend of Colorado River water from Lake Mathews through the Metropolitan Lower Feeder and SWP water through the Yorba Linda Feeder.

Imported water is conveyed to SCWD through two major pipeline systems to South Orange County. The EOCF #2 system conveys Diemer water to the Aufdenkamp Transmission Main (ATM) and subsequently to the Joint Transmission Main (JTM) which serves SCWD and other coastal agencies. SCWD has capacity rights of 5 cubic feet per second (cfs) in the ATM reach from the Coastal Junction to the northerly border of El Toro Water District. In the downstream reach extending to Coast Highway in Laguna Beach, SCWD's capacity increases to 8 cfs due to potential flows from the Coast Supply Line. SCWD's capacity is 6.34 cfs in the JTM. The other major conveyance system is the Allen-McCulloch Pipeline (AMP) which supplies Diemer water through the South County Pump Station in Lake Forest, to the South County Pipeline (SCP) through Santa Margarita Water District to San Clemente, from where it is delivered to SCWD through the Water Importation Pipeline (WIP) along Coast Highway. SCWD's capacity right in the AMP is 10.7 cfs shared with the City of San Clemente. Downstream, SCWD owns 25 cfs in the South County Pipeline. SCWD has purchased operational capacity in Santa Margarita Water District's (SMWD) Upper Chiquita Reservoir that will augment SCWD's ability to meet peak demands from the SCP.

Imported water, treated at Diemer Filtration Plant in Yorba Linda, is conveyed to SCWD through the EOCF #2 by the Aufdenkamp Transmission Main (ATM), where SCWD has a total of 8 cfs capacity and by the Joint Transmission Main (JTM) where SCWD has 6.34 cfs capacity.

The SCP was constructed by the Santa Margarita Water District in 1990, with participation by Metropolitan. The pipeline originates at the AMP ST-21 turnout near the Baker Filtration Plant in Lake Forest. The SCWD has a total capacity of 3.93 cfs in this pipeline.

Since 2000, SCWD has operated, maintained, and administered the Joint Regional Water Supply System (JRWSS). The JRWSS distributes imported drinking water from Metropolitan throughout South Orange County. The system includes 30 miles of transmission mains and two reservoirs that hold a total of 60 MG of water. JRWSS is jointly owned by and provides water to SCWD, Irvine Ranch Water District, El Toro Water District, Moulton Niguel Water District, City of San Juan Capistrano, City of San Clemente, and three San Diego County Water Authority (SDCWA) agencies. Each of the individual wholesale agencies will be reporting their projections in their own UWMP.

Table 3-1: JRWSS for SDCWA Service Area – Total Retail Projections (AFY)

| | Fiscal Year Ending | | | | | |
|-----------|--------------------|------|------|------|------|------|
| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
| Water Use | 764 | 780 | 780 | 780 | 780 | 780 |
| Customers | 3 | 3 | 3 | 3 | 3 | 3 |

3.2.1. Metropolitan’s 2010 Regional Urban Water Management Plan

Metropolitan’s 2010 Regional Urban Water Management Plan (RUWMP) reports on its water reliability and identifies projected supplies to meet the long-term demand within its service area. It presents Metropolitan’s supply capacities from 2015 through 2035 under the three hydrologic conditions specified in the Act: single dry-year, multiple dry-years, and average year.

Colorado River Supplies

Colorado River Aqueduct supplies include supplies that would result from existing and committed programs and from implementation of the Quantification Settlement Agreement (QSA) and related agreements to transfer water from agricultural agencies to urban uses. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis.

State Water Project Supplies

Metropolitan’s SWP supplies have been impacted in recent years by restrictions on SWP operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008 and June 4, 2009, respectively. In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley/SWP storage and transfer programs. The goal of the storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Banks pumping capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. The Delta action plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Bay-Delta while the long-term solution is implemented.

State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing the basic elements that include the Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In evaluating the supply capabilities for the 2010 RUWMP, Metropolitan assumed a new Delta conveyance is fully operational by 2022 that would return supply reliability similar to 2005 condition, prior to supply restrictions imposed due to the Biological Opinions.

Storage

Storage is a major component of Metropolitan's dry year resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing its Water Supply Allocation Plan (WSAP), is dependent on its storage resources. In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of five-year increments based on the balances of supplies and demands.

Supply Reliability

Metropolitan evaluated supply reliability by projecting supply and demand conditions for the single- and multi-year drought cases based on conditions affecting the SWP (Metropolitan's largest and most variable supply). For this supply source, the single driest-year was 1977 and the three-year dry period was 1990-1992. Metropolitan's analyses are illustrated in Tables 3-2, 3-3, and 3-4 which correspond to Metropolitan's 2010 RUWMP's Tables 2-11, 2-9 and 2-10, respectively. These tables show that the region can provide reliable water supplies not only under normal conditions but also under both the single driest year and the multiple dry year hydrologies.

Table 3-2: Metropolitan Average Year Projected Supply Capability and Demands for 2015 to 2035

| Average Year Supply Capability¹ and Projected Demands Average of 1922-2004 Hydrologies (acre-feet per year) | | | | | |
|---|------------------|------------------|------------------|------------------|------------------|
| Forecast Year | 2015 | 2020 | 2025 | 2030 | 2035 |
| Current Programs | | | | | |
| In-Region Storage and Programs | 685,000 | 931,000 | 1,076,000 | 964,000 | 830,000 |
| California Aqueduct ² | 1,550,000 | 1,629,000 | 1,763,000 | 1,733,000 | 1,734,000 |
| Colorado River Aqueduct | | | | | |
| Colorado River Aqueduct Supply ³ | 1,507,000 | 1,529,000 | 1,472,000 | 1,432,000 | 1,429,000 |
| Aqueduct Capacity Limit ⁴ | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 |
| Colorado River Aqueduct Capability | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 |
| Capability of Current Programs | 3,485,000 | 3,810,000 | 4,089,000 | 3,947,000 | 3,814,000 |
| Demands | | | | | |
| Firm Demands of Metropolitan | 1,826,000 | 1,660,000 | 1,705,000 | 1,769,000 | 1,826,000 |
| IID-SDCWA Transfers and Canal Linings | 180,000 | 273,000 | 280,000 | 280,000 | 280,000 |
| Total Demands on Metropolitan⁵ | 2,006,000 | 1,933,000 | 1,985,000 | 2,049,000 | 2,106,000 |
| Surplus | 1,479,000 | 1,877,000 | 2,104,000 | 1,898,000 | 1,708,000 |
| Programs Under Development | | | | | |
| In-Region Storage and Programs | 206,000 | 306,000 | 336,000 | 336,000 | 336,000 |
| California Aqueduct | 382,000 | 383,000 | 715,000 | 715,000 | 715,000 |
| Colorado River Aqueduct | | | | | |
| Colorado River Aqueduct Supply ³ | 187,000 | 187,000 | 187,000 | 182,000 | 182,000 |
| Aqueduct Capacity Limit ⁴ | 0 | 0 | 0 | 0 | 0 |
| Colorado River Aqueduct Capability | 0 | 0 | 0 | 0 | 0 |
| Capability of Proposed Programs | 588,000 | 689,000 | 1,051,000 | 1,051,000 | 1,051,000 |
| Potential Surplus | 2,067,000 | 2,566,000 | 3,155,000 | 2,949,000 | 2,759,000 |

¹ Represents Supply Capability for resource programs under listed year type.

² California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

³ Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

⁴ Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

⁵ Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 3-3: Metropolitan Single-Dry Year Projected Supply Capability and Demands for 2015 to 2035

**Single Dry-Year
Supply Capability¹ and Projected Demands
Repeat of 1977 Hydrology
(acre-feet per year)**

| Forecast Year | 2015 | 2020 | 2025 | 2030 | 2035 |
|--|------------------|------------------|------------------|------------------|------------------|
| Current Programs | | | | | |
| In-Region Storage and Programs | 685,000 | 931,000 | 1,076,000 | 964,000 | 830,000 |
| California Aqueduct ² | 522,000 | 601,000 | 651,000 | 609,000 | 610,000 |
| Colorado River Aqueduct | | | | | |
| Colorado River Aqueduct Supply ³ | 1,416,000 | 1,824,000 | 1,669,000 | 1,419,000 | 1,419,000 |
| Aqueduct Capacity Limit ⁴ | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 |
| Colorado River Aqueduct Capability | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 |
| Capability of Current Programs | 2,457,000 | 2,782,000 | 2,977,000 | 2,823,000 | 2,690,000 |
| Demands | | | | | |
| Firm Demands of Metropolitan | 1,991,000 | 1,889,000 | 1,921,000 | 1,974,000 | 2,039,000 |
| IID-SDCWA Transfers and Canal Linings | 180,000 | 273,000 | 280,000 | 280,000 | 280,000 |
| Total Demands on Metropolitan⁵ | 2,171,000 | 2,162,000 | 2,201,000 | 2,254,000 | 2,319,000 |
| Surplus | 286,000 | 620,000 | 776,000 | 569,000 | 371,000 |
| Programs Under Development | | | | | |
| In-Region Storage and Programs | 206,000 | 306,000 | 336,000 | 336,000 | 336,000 |
| California Aqueduct | 556,000 | 556,000 | 700,000 | 700,000 | 700,000 |
| Colorado River Aqueduct | | | | | |
| Colorado River Aqueduct Supply ³ | 187,000 | 187,000 | 187,000 | 182,000 | 182,000 |
| Aqueduct Capacity Limit ⁴ | 0 | 0 | 0 | 0 | 0 |
| Colorado River Aqueduct Capability | 0 | 0 | 0 | 0 | 0 |
| Capability of Proposed Programs | 762,000 | 862,000 | 1,036,000 | 1,036,000 | 1,036,000 |
| Potential Surplus | 1,048,000 | 1,482,000 | 1,812,000 | 1,605,000 | 1,407,000 |

¹ Represents Supply Capability for resource programs under listed year type.

² California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

³ Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

⁴ Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

⁵ Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 3-4: Metropolitan Multiple-Dry Year Projected Supply Capability and Demands for 2015 to 2035

| Multiple Dry-Year Supply Capability¹ and Projected Demands Repeat of 1990-1992 Hydrology (acre-feet per year) | | | | | |
|---|------------------|------------------|------------------|------------------|------------------|
| Forecast Year | 2015 | 2020 | 2025 | 2030 | 2035 |
| Current Programs | | | | | |
| In-Region Storage and Programs | 246,000 | 373,000 | 435,000 | 398,000 | 353,000 |
| California Aqueduct ² | 752,000 | 794,000 | 835,000 | 811,000 | 812,000 |
| Colorado River Aqueduct | | | | | |
| Colorado River Aqueduct Supply ³ | 1,318,000 | 1,600,000 | 1,417,000 | 1,416,000 | 1,416,000 |
| Aqueduct Capacity Limit ⁴ | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 |
| Colorado River Aqueduct Capability | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 | 1,250,000 |
| Capability of Current Programs | 2,248,000 | 2,417,000 | 2,520,000 | 2,459,000 | 2,415,000 |
| Demands | | | | | |
| Firm Demands of Metropolitan | 2,056,000 | 1,947,000 | 2,003,000 | 2,059,000 | 2,119,000 |
| IID-SDCWA Transfers and Canal Linings | 180,000 | 241,000 | 280,000 | 280,000 | 280,000 |
| Total Demands on Metropolitan⁵ | 2,236,000 | 2,188,000 | 2,283,000 | 2,339,000 | 2,399,000 |
| Surplus | 12,000 | 229,000 | 237,000 | 120,000 | 16,000 |
| Programs Under Development | | | | | |
| In-Region Storage and Programs | 162,000 | 280,000 | 314,000 | 336,000 | 336,000 |
| California Aqueduct | 242,000 | 273,000 | 419,000 | 419,000 | 419,000 |
| Colorado River Aqueduct | | | | | |
| Colorado River Aqueduct Supply ³ | 187,000 | 187,000 | 187,000 | 182,000 | 182,000 |
| Aqueduct Capacity Limit ⁴ | 0 | 0 | 0 | 0 | 0 |
| Colorado River Aqueduct Capability | 0 | 0 | 0 | 0 | 0 |
| Capability of Proposed Programs | 404,000 | 553,000 | 733,000 | 755,000 | 755,000 |
| Potential Surplus | 416,000 | 782,000 | 970,000 | 875,000 | 771,000 |

¹ Represents Supply Capability for resource programs under listed year type.

² California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

³ Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

⁴ Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

⁵ Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

3.2.2. SCWD's Imported Water Supply Projections

Based on Metropolitan's supply projections that it will be able to meet full service demands under all three hydrologic scenarios, MWDOC, Orange County's wholesale supplier projects that it would also be able to meet the demands of its retail agencies under these conditions.

California Water Code section 10631 (k) requires the wholesale agency to provide information to the urban retail water supplier for inclusion in its UWMP that identifies and quantifies the existing and planned sources of water available from the wholesale agency. Table 3-5 indicates the wholesaler's water availability projections by source for the next 25 years as provided to SCWD by MWDOC. The water supply projections shown in Table 3-5 represent the amount of supplies projected to meet demands. They do not represent the full supply capacity.

Table 3-5: Wholesaler Identified & Quantified Existing and Planned Sources of Water (AFY)

| Wholesaler Sources | Fiscal Year Ending | | | | |
|--------------------|--------------------|-------|-------|-------|----------|
| | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| MWDOC | 5,808 | 5,295 | 5,305 | 5,336 | 5,336 |

3.3. Groundwater

In 2008, SCWD incorporated local groundwater into its water resource portfolio with the construction of its GRF. SCWD extracts its groundwater from the San Juan Basin, which is part of the San Juan Creek Watershed. Groundwater currently represents 634 AFY, or 9 percent, of SCWD's total water supply. SCWD plans to expand and increase its groundwater supply to 2,000 AFY by 2020 with the addition of a second and third well.

3.3.1. San Juan Basin Characteristics

The San Juan Basin is located in southern Orange County within the San Juan Creek Watershed and is comprised of four sub-basins: Upper San Juan, Middle San Juan, Lower San Juan and Lower Trabuco. The basin is bounded on the west by the Pacific Ocean and otherwise by tertiary semi-permeable marine deposits. San Juan Creek drains the San Juan Valley, and several other creeks drain valley tributaries to the San Juan.

The primary water-bearing unit within the Basin is Quaternary alluvium - a heterogeneous mixture of sand, silt, and gravel in the eastern portion of the basin to coarse sand near the center to fine-grained lagoonal sediments in the western portion of the basin. Thickness of the alluvium average about 65 feet and may reach more than 125 feet. The total storage capacity has been estimated to be 90,000 AF. Wells typically yield from 450 to 1,000 gpm.

Recharge of the Basin is from flow in San Juan Creek, Oso Creek, and Arroyo Trabuco and precipitation to the valley floor. Water from springs flows directly from Hot Spring Canyon into San Juan Creek adding to recharge.

3.3.2. San Juan Basin Management

The State Water Resources Control Board (SWRCB) has determined that the San Juan Creek watershed is not a groundwater basin, but a surface and underground flowing stream and, therefore, it is subject to SWRCB jurisdiction and its processes with respect to the appropriation and use of waters within the watershed. SCWD is a member of the San Juan Basin Authority (SJBA) a joint powers agency, formed in 1971 to manage the watershed. Other member agencies include the City of San Juan Capistrano, Moulton Niguel Water District and Santa Margarita Water District. SJBA has SWRCB Permit for Diversion and Use of Water Permit No. 21074 for appropriation and diversion of up to 8,026 acre-feet per year, with the ability to increase to 10,702 acre-feet of water per year upon demonstration of sufficient availability of unappropriated water.

As a member of the SJBA, SCWD is entitled to participate in the development of projects to appropriate and divert water from the San Juan Watershed.

3.3.3. Groundwater Budget

A study by NBS Lowry (1994) investigated and modeled the Basin for 1979 through 1990. They determined a mean pump extraction capacity of 5,621 AFY and a mean subsurface inflow of 2,246 AFY. Average subsurface outflow to the ocean is estimated to be about 450 AFY.

SJBA approved the San Juan Basin Groundwater Management and Facility Plan (GMFP) in 1995 (Appendix B). GMFP represents the first step in the implementation of the SJBA mission to develop and maintain a reliable, good quality and economical local water supply for the residents in the Basin by maximizing use of local ground and surface water, the San Juan Creek and its tributaries, with due consideration for the preservation and enhancement of the environment, including, but not limited to, natural resources, fish and wildlife, infrastructure improvements and the cultural heritage of the area. Additional studies, such as the Preliminary Well Design and Site Selection Report, prepared in June 2001 by Geotechnical Consultants, Inc., confirm the findings in the SJBA Groundwater Management and Facility Plan.

3.3.4. Groundwater Rights

SCWD is permitted to extract 976 AFY from the San Juan Basin by the State Water Resources Control Board. The permit provides for increasing the extraction to 1,300 AFY upon showing the availability of unappropriated water. SCWD is currently assembling the data to substantiate the availability of the additional water. SCWD is also preparing

background information and a request for an amendment to the permit for allowing the extraction of 3,200 AFY from the San Juan Basin.

Table 3-6: Groundwater Rights (AFY)

| Basin Name | Water Rights (AFY) |
|----------------------------|--------------------|
| San Juan Groundwater Basin | 976 |
| Total | 976 |

3.3.5. Capistrano Beach Groundwater Recovery Facility (GRF)

SCWD constructed a 1 MGD GRF that came on-line in FY 07-08 in Capistrano Beach, adjacent to San Juan Creek. The plant was built initially for 1,300 AFY but production is currently limited to about 800 AFY by water rights restrictions and the capacity of a single well. The plant extracts brackish groundwater from an aquifer in the San Juan Basin. The water is treated using Reverse Osmosis and some of the groundwater goes through iron and manganese removal due to high mineral content. SCWD plans to expand the GRF facilities as well as adding another well. More information can be found in Section 7.

3.3.6. Historical and Projected GRF Production

In 2000, the California State Water Resources Control Board granted a water rights permit of 8,026 *AF/Yr* to SJBA for diversion and use from the Basin. The permit also allows additional 2,676 *AF/Yr* in the future depending on certain conditions specified in the permit. (A copy of the Permit is available in the offices of SCWD). SCWD obtained its own permit from the State Water Resources Control Board. That permit allows SCWD to extract 976 acre feet per year with an additional 324 acre foot per year in the future depending upon certain conditions specified in the permit. A copy of the permit is available in the offices of SCWD.

SCWD began producing water from the Basin in FY 2007-2008 when the GRF can on-line. Table 3-7 shows all groundwater produced by SCWD from 2005 to 2009.

Table 3-7: Amount of Groundwater Pumped in the Past 5 Years (AFY)

| Basin Name(s) | Fiscal Year Ending | | | | |
|--------------------------------|--------------------|-----------|-----------|-----------|-----------|
| | 2005 | 2006 | 2007 | 2008 | 2009 |
| San Juan Basin (GRP) | 0 | 0 | 0 | 258 | 748 |
| % of Total Water Supply | 0% | 0% | 0% | 3% | 9% |

Table 3-8 illustrates the amount of groundwater projected to be produced from the Basin between 2015 and 2035 and the percentage of projected groundwater supplies to the total water supplies.

Table 3-8: Amount of Groundwater Projected to be Pumped (AFY)

| Basin Name(s) | Fiscal Year Ending | | | | | |
|--------------------------------|--------------------|------------|------------|------------|------------|------------|
| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| San Juan Basin (GRP) | 634 | 1,300 | 2,000 | 2,000 | 2,000 | 2,000 |
| % of Total Water Supply | 9% | 16% | 24% | 24% | 23% | 23% |

3.4. Recycled Water

One of the major components of SCWD's water conservation program is its recycled water program. SCWD provides additional treatment to a portion of its secondary treated wastewater, rather than discharging it to the ocean. Recycled water is then used for landscape irrigation services. Demands continue to increase as new and existing potable water irrigation services are continually being connected to the recycled water system. SCWD's recycled water program is more fully described in Section 6.

3.5. Supply Reliability

3.5.1. Overview

It is required that every urban water supplier assess the reliability to provide water service to its customers under normal, dry, and multiple dry water years. SCWD depends on a combination of imported and local supplies to meet its water demands and has taken numerous steps to ensure it has adequate supplies. Development of groundwater recovery, recycled water system, desalination opportunities, and collection of urban return flows augment the reliability of the imported water system. There are various factors that may impact reliability of supplies such as legal, environmental, water quality and climatic which are discussed below. The water supplies are projected to meet full-service demands; Metropolitan's 2010 RUWMP finds that Metropolitan is able to meet with existing supplies, full-service demands of its member agencies starting 2015 through 2035 during normal years, single dry year, and multiple dry years.

Metropolitan's 2010 Integrated Water Resources Plan (IRP) update describes the core water resource strategy that will be used to meet full-service demands at the retail level under all foreseeable hydrologic conditions from 2015 through 2035. The foundation of Metropolitan's resource strategy for achieving regional water supply reliability has been to develop and implement water resources programs and activities through its IRP preferred resource mix. This preferred resource mix includes conservation, local

resources such as water recycling and groundwater recovery, Colorado River supplies and transfers, SWP supplies and transfers, in-region surface reservoir storage, in-region groundwater storage, out-of-region banking, treatment, conveyance and infrastructure improvements. MWDOC is reliant on Metropolitan for all of its imported water. With the addition of planned supplies under development, Metropolitan's 2010 RUWMP finds that Metropolitan will be able to meet full-service demands from 2015 through 2035, even under a repeat of the worst drought. Table 3-9 shows the reliability of the wholesaler's supply for single dry year and multiple dry year scenarios.

Table 3-9: Wholesaler Supply Reliability - % of Normal AFY

| Wholesaler Sources | Single Dry | Multiple Dry Water Years | | |
|--------------------|------------|--------------------------|--------|--------|
| | | Year 1 | Year 2 | Year 3 |
| MWDOC | 100% | 100% | 100% | 100% |

In addition to meeting full-service demands from 2015 through 2035, Metropolitan projects reserve and replenishment supplies to refill system storage. MWDOC's 2010 RUWMP states that it will meet full-service demands to its customers from 2015 through 2035. Table 3-10 shows the basis of water year data used to predict drought supply availability.

Table 3-10: Basis of Water Year Data

| Water Year Type | Base Year | Base Year | Base Year |
|--------------------------|-------------------|-----------|-----------|
| Normal Water Year | Average 1922-2004 | | |
| Single-Dry Water Year | 1977 | | |
| Multiple-Dry Water Years | 1990 | 1991 | 1992 |

3.5.2. Factors Impacting Reliability

The Act requires a description of the reliability of the water supply and vulnerability to seasonal or climatic shortage. SCWD relies on import supplies provided by Metropolitan through MWDOC. The following are some of the factors identified by Metropolitan that may have an impact on the reliability of Metropolitan supplies.

Environment – Endangered species protection needs in the Sacramento-San Joaquin River Delta have resulted in operational constraints to the SWP system. The Bay-Delta's declining ecosystem caused by agricultural runoff, operation of water pumps and other factors has led to historical restrictions in SWP supply deliveries. SWP delivery restrictions due to the biological opinions resulted in the loss of about one-third of the available SWP supplies in 2008. In 2010, Metropolitan received 15% of its allocation from the SWP.

Legal – Listings of additional species under the Endangered Species Act and new regulatory requirements could impact SWP operations by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations. Additionally, the Quantification Settlement Agreement has been challenged in courts and may have impacts on the Imperial Irrigation District and San Diego County Water Authority transfer. If there are negative impacts, San Diego could become more dependent on the Metropolitan supplies.

Water Quality –Water imported from the Colorado River Aqueduct (CRA) contains high level of salts. The operational constraint is that this water needs to be blended with SWP supplies to meet the target salinity of 500 mg/L of total dissolved solids (TDS). The high salinity also impacts SCWD’s ability to produce recycled water of an acceptable quality. Another water quality concern is related to the quagga mussel. Controlling the spread and impacts of quagga mussels within the Colorado River Aqueduct requires extensive maintenance and results in reduced operational flexibility.

Climate Change – Changing climate patterns are expected to shift precipitation patterns and affect water supply. Unpredictable weather patterns will make water supply planning even more challenging. The areas of concern for California include the reduction in Sierra Nevada snowpack, increased intensity and frequency of extreme weather events, and rising sea levels causing increased risk of levee failure.

Legal, environmental, and water quality issues may have impacts on Metropolitan supplies. It is felt, however, that climatic factors would have more of an impact than the others. Climatic conditions have been projected based on historical patterns; however severe pattern changes may occur in the future. Table 3-11 shows the factors resulting in inconsistency of supply.

Table 3-11: Factors Resulting in Inconsistency of Supply

| Name of Supply | Legal | Environmental | Water Quality | Climatic |
|---------------------|-------|---------------|---------------|----------|
| State Water Project | X | X | | |
| Colorado River | | | X | X |

These and other factors are addressed in greater detail in Metropolitan’s 2010 RUWMP.

3.5.2.1. Water Quality

Imported Water - Metropolitan is responsible for providing water of a high quality throughout its service area. The water that Metropolitan delivers is tested both for currently regulated contaminants and for additional contaminants of concern as over 300,000 water quality tests are conducted each year to regulate the safety of its waters.

Metropolitan's supplies originate primarily from the Colorado River Aqueduct (CRA) and from the State Water Project (SWP). A blend of these two sources, proportional to each year's availability of the source, is then delivered throughout Metropolitan's service area.

Metropolitan's primary sources face individual water quality issues of concern. The CRA water source contains a higher level of total dissolved solids (TDS) and a lower level of organic material while the SWP contains a lower TDS level while its level of organic materials is much higher, leading to the formation of disinfection byproducts. To remediate the CRA's high level of salinity and the SWP's high level of organic materials, Metropolitan has been blending CRA water with SWP supplies as well as implementing updated treatment processes to decrease the disinfection byproducts. In addition, Metropolitan has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium VI while also investigating the potential water quality impact of emerging contaminants, N-nitrosodimethylamine (NDMA) and pharmaceuticals and personal care products (PPCPs). Metropolitan has assured its ability to overcome the above mentioned water quality concerns through its protection of source waters, implementation of renovated treatment processes, and blending of its two sources. While unforeseeable water quality issues could alter reliability, Metropolitan's current strategies ensure the deliverability of high quality water.

Groundwater - Groundwater pumping from the San Juan Basin has declined over the years due to the poor water quality. The mineral content of groundwater in the basin is variable, however, the basin typically has calcium bicarbonate or bicarbonate-sulfate character below the upper reaches of the valleys, and calcium-sodium sulfate or sulfate-chloride near the coast. In general, TDS content in groundwater increases from below 500 mg/L in the upper reaches of the valley to near 2,200 mg/L near the coast. TDS content of water from 3 public supply wells averages 760 mg/L and ranges from 430 mg/L to 1,250 mg/L.

Table 3-12 shows the impact in acre-feet per year that water quality would have on supply.

Table 3-12: Water Quality – Current and Projected Water Supply Impacts (AFY)

| Water Source | Fiscal Year Ending | | | | | |
|--------------|--------------------|------|------|------|------|----------|
| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| Imported | 0 | 0 | 0 | 0 | 0 | 0 |
| Local | 0 | 0 | 0 | 0 | 0 | 0 |

3.5.3. Normal-Year Reliability Comparison

SCWD has entitlements and/or written contracts to receive imported water from Metropolitan via the regional distribution system. Although pipeline capacity rights do not guarantee the availability of water, per se, they do guarantee the ability to convey water when it is available to the Metropolitan distribution system. All imported water supplies assumed in this section are available to SCWD from existing water transmission facilities. Table 3-13 shows supply and demand under normal year conditions. Water supplies are projected to be available from Metropolitan; however, it is not included here since projected supplies meet projected demands.

Table 3-13: Projected Normal Water Supply and Demand (AFY)

| | Fiscal Year Ending | | | | |
|---------------------|--------------------|--------------|--------------|--------------|--------------|
| | 2015 | 2020 | 2025 | 2030 | 2035 |
| Total Demand | 8,208 | 8,495 | 8,605 | 8,736 | 8,736 |
| San Juan (GRP) | 1,300 | 2,000 | 2,000 | 2,000 | 2,000 |
| Recycled Water | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |
| Imported | 5,808 | 5,295 | 5,305 | 5,336 | 5,336 |
| Total Supply | 8,208 | 8,495 | 8,605 | 8,736 | 8,736 |

3.5.4. Single Dry-Year Reliability Comparison

SCWD has documented that it is 100% reliable for single dry year demands from 2015 through 2035 with a demand increase of 5.7% using FY 2006-07 as the single dry-year. Table 3-14 compiles supply and demand projections for a single dry water year. The available imported supply is greater than shown; however, it is not included because all demands are met.

Table 3-14: Projected Single-Dry Year Water Supply and Demand (AFY)

| | Fiscal Year Ending | | | | |
|---------------------|--------------------|--------------|--------------|--------------|--------------|
| | 2015 | 2020 | 2025 | 2030 | 2035 |
| Total Demand | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |
| San Juan (GRP) | 1,300 | 2,000 | 2,000 | 2,000 | 2,000 |
| Recycled Water | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |
| Imported | 6,276 | 5,779 | 5,795 | 5,834 | 5,834 |
| Total Supply | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |

3.5.5. Multiple Dry-Year Reliability Comparison

SCWD is capable of providing their customers all their demands with significant reserves in multiple dry years from 2015 through 2035 with a demand increase of 5.7% using FY 2006-07 as the multiple dry-years. This is true even if the demand projections were to be

increased by a large margin. Table 3-15 shows supply and demand projections under multiple dry year conditions.

Table 3-15: Projected Multiple Dry Year Period Supply and Demand (AFY)

| | | Fiscal Year Ending | | | | |
|--------------------|---------------------|--------------------|--------------|--------------|--------------|--------------|
| | | 2015 | 2020 | 2025 | 2030 | 2035 |
| First Year Supply | Total Demand | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |
| | San Juan (GRP) | 1,300 | 2,000 | 2,000 | 2,000 | 2,000 |
| | Recycled Water | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |
| | Imported | 6,276 | 5,779 | 5,795 | 5,834 | 5,834 |
| | Total Supply | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |
| Second Year Supply | Total Demand | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |
| | San Juan (GRP) | 1,300 | 2,000 | 2,000 | 2,000 | 2,000 |
| | Recycled Water | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |
| | Imported | 6,276 | 5,779 | 5,795 | 5,834 | 5,834 |
| | Total Supply | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |
| Third Year Supply | Total Demand | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |
| | San Juan (GRP) | 1,300 | 2,000 | 2,000 | 2,000 | 2,000 |
| | Recycled Water | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |
| | Imported | 6,276 | 5,779 | 5,795 | 5,834 | 5,834 |
| | Total Supply | 8,676 | 8,979 | 9,095 | 9,234 | 9,234 |

4. Demand Management Measures

4.1. Overview

Water conservation, often called demand-side management, can be defined as practices, techniques, and technologies that improve the efficiency of water use. Such practices are referred to as demand management measures (DMM). Increased efficiency expands the use of the water resource, freeing up water supplies for other uses, such as population growth, new industry, and environmental conservation.

The increasing efforts in water conservation are spurred by a number of factors: drought conditions, climate change, growing competition for limited supplies, increasing costs and difficulties in developing new supplies, optimization of existing facilities, delay of capital investments in capacity expansion, and growing public support for the conservation of limited natural resources and adequate water supplies to preserve environmental integrity.

SCWD recognizes the importance of water conservation and has made water use efficiency an integral part of water use planning. SCWD has been a signatory to the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMPs) Memorandum of Understanding (MOU) since 1991. DMMs as defined by the Act correspond to the CUWCC's BMPs. SCWD is currently implementing all 14 DMMs described in the Act.

This section of the UWMP satisfies the requirements of § 10631 (f) & (j). It describes how each DMM is being implemented by SCWD and how SCWD evaluates the effectiveness of the DMMs implemented. This section also provides an estimate of existing conservation savings where information is available.

4.2. Water Use Efficiency Programs

As Signatory to the CUWCC MOU, SCWD has committed to use good-faith efforts to implement the 14 cost-effective BMPs. SCWD has implemented and is actively participating in many water conservation activities. SCWD's existing Water Conservation Ordinance 173 was reviewed, open to the public and stakeholder comment, revised, expanded and adopted by the SCWD Board of Directors on April 23, 2009 as Water Conservation and Water Supply Shortage Ordinance 206.

Moreover, as a member agency of MWDOC, SCWD actively participates in various Metropolitan residential and CII rebate programs, as well as school and public education

and outreach programs, and other programs administered by MWDOC. MWDOC implements many of the urban water conservation BMPs on behalf of its member agencies. MWDOC's 2010 RUWMP should be referred to for a detailed discussion of each regional BMP program. SCWD works cooperatively with MWDOC for technical and financial support needed to facilitate meeting the terms of the CUWCC MOU. MWDOC's current Water Use Efficiency Program, detailed in their 2010 RUWMP, implemented on behalf of its member agencies following three basic focuses:

1. Regional Program Development – MWDOC develops, obtains funding for, and implements regional BMP programs on behalf of all retail water agencies in Orange County.
2. Local Program Assistance - MWDOC assists retail agencies to develop and implement local programs within their individual service areas.
3. Research and Evaluation – MWDOC conducts research programs which allow an agency to measure the water savings benefits of a specific program and then compare those benefits to the costs of implementing the program in order to evaluate the economic feasibility of the program.

Table 4-1 provides an overview of SCWD's DMM program status.

Table 4-1: Urban Supplier's Demand Management Measures Overview

| Demand Management Measure (DMM) | DMM Status | | |
|---|------------|---------|--------|
| | Past | Current | Future |
| Residential Water Surveys | | X | |
| Residential Plumbing Retrofits | | X | |
| System Water Audits, Leak Detection and Repair | | X | |
| Metering with Commodity Rates | | X | |
| Large Landscape Conservation Programs | | X | |
| High-Efficiency Washing Machine Rebates | | X | |
| Public Information Programs | | X | |
| School Education Programs | | X | |
| Commercial, Industrial and Institutional Programs | | X | |
| Wholesale Agency Assistance | | N/A | |
| Conservation Pricing | | X | |
| Conservation Coordinator | | X | |
| Water Waste Prohibition | | X | |
| Residential ULFT Replacement Programs | X | X | |

4.2.1. DMM 1: Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers

SCWD currently conducts residential survey on an as-needed basis. When a high bill complaint is received, staff is sent out to conduct an audit. SCWD also participates in regional landscape programs aimed at helping residential and small commercial customers to be more water efficient through MWDOC. A thorough site inspection that includes a landscape survey is conducted as part of the Smart Timer and Rotating Nozzle Rebate Programs. Details of these residential landscape water use efficiency programs are provided below.

Smart Timer Rebate Program - The Smart Timer Rebate Program started in FY 2004/05. Under this regional program, residential and small commercial properties are eligible for a rebate when they purchase and install a weather-based irrigation controller which has the potential to save 41 gallons per day per residence and reduce runoff and pollution by 49%. To date, 48 rebates have been given out to residential customers and 95 rebates to small commercial customers within SCWD's service area which translate to a water savings of 498 acre-feet, collectively. SCWD will continue to provide on-site meetings, literature and incentives related to this program. As part of the MWDOC Grant for the Smart Timers a site audit and inspection is required and provided by contract through MWDOC.

Rotating Nozzle Rebate Program – This rebate program started in 2007 and is offered to both residential and commercial customers. Through this program, site owners will purchase and install rotary nozzles in existing irrigation systems. Following the submittal of a rebate application, water bill, and original purchase receipt, MWDOC will direct a third party installation verification contractor to perform installation verifications on up to 100% of the sites that installed devices. To date, within the SCWD's service area, 221 rotating nozzles have been installed at residential properties and another 133 at small commercial representing a combined water savings of 4.82 acre-feet since the beginning of the program.

Synthetic Turf Rebate Program – Through this program, residential and small commercial customers of participating retail water agencies are eligible to receive rebate money for qualifying synthetic turf projects. To date 26,442 sq. ft. of turf grass have been replaced by synthetic turf on residential properties translating to a water savings of 8.85 acre-feet for the SCWD service area.

South County SmartScape: Landscape Improvement Incentive Program - MWDOC has obtained grant funding from the State Water Resources Control Board and the County of Orange to implement this Program. The purpose of the Program is to retrofit existing high water-using landscapes with 'fixes' that will reduce the site's outdoor water consumption in single-family homes and small commercial properties. This program is

only offered to retail water agencies in the South Orange County Integrated Regional Watershed Management Plan (SOCIRWMP) Area. Each site, within each of the program’s eligible areas, will receive a menu-option of retrofit improvements, labeled as “A,” “AB,” or “ABC,” indicating which specific set of improvements may be implemented. The three different retrofit improvement designations are summarized in Table 4-2:

Table 4-2: Retrofit Improvement Designations

| Retrofit Type | Improvement Description |
|---------------|---|
| A | Replacement of an existing conventional “dumb” irrigation timer with a weather-based “smart timer” irrigation controller. REQUIRED STEP (limit of 1 per site) |
| B | Replacement with a weather-based controller <u>and</u> implementation of specific irrigation distribution system improvements (may include both front and back yards). |
| C | Replacement with a weather-based controller, <u>and</u> implementation of irrigation distribution system improvements, <u>and</u> replacement of high water using plants, specifically turf grass with a choice of certain water-efficient landscape improvements from a Program Plant List of California Friendly® and native species (plant replacement retrofits in front yards only). |

All sites that choose to participate in this program must receive Retrofit Type A. Depending on the outcome of a pre-installation landscape audit performed by a third party contractor employed by MWDOC, sites may become eligible for Retrofit Types A and B, and/or Types A, B, and C. Participating sites may not receive Type B or C without having a smart timer (Type A) installed.

California Friendly Landscape Training (Residential) - The California Friendly Landscape Training provides education to residential homeowners and professional landscape contractors on a variety of landscape water efficiency practices they can employ. These classes are hosted by MWDOC and/or the retail agencies to encourage participation across the county. The residential training program consists of either a half-day Mini Class or individual, topic-specific, four-hour classes.

Local Residential Landscape Program – SCWD currently funds three in house rebate programs. The Turf Removal Rebate Program is available to all customers. SCWD rebates \$2.00 per square feet up to 500 square feet per site to remove established irrigated turf and replace it with synthetic turf. The second program allows customers who remove

at least 250 square feet of irrigated turf and replace it with California-friendly plants are eligible to receive up to \$300.00 in rebates on qualifying plant purchases. The third program is a High Efficiency Toilet (HET) Rebate Program pre approved sites replace pre-1992 toilets and retrofit to HET's to receive up to a \$200.00 rebate per approved unit.

4.2.2. DMM 2: Residential Plumbing Retrofit

SCWD participated in Metropolitan's showerhead distribution program which began in 1991. To determine whether the 75% saturation requirement was achieved within Orange County, the *Orange County Saturation Study* was conducted by MWDOC and Metropolitan in 2001. Data was obtained through telephone surveys and on-site inspections. Using the saturation findings of the study, MWDOC estimates that today low flow showerhead saturation is at nearly 100% for single-family homes and at 94% for multi-family homes. As a result, SCWD does not have plans for any future showerhead distributions.

Additionally, SCWD participated in MWDOC's regional ultra low flow toilet (ULFT) rebate program which ended in 2009. A total of 7,607 ULFTs were distributed under this program to single-family and multi-family homes within SCWD service area representing a cumulative water savings of 2,867 acre-feet. The high efficiency toilet (HET) rebate program has since replaced the ULFT program as discussed under DMM 14. SCWD has met the CUWCC BMP coverage requirements for this BMP. SCWD also promotes and distributes low-flow devices at public outreach events throughout the year.

4.2.3. DMM 3: System Water Audits, Leak Detection and Repair

In an effort to assist its retail agencies, MWDOC publishes annually the *Orange County Water Agencies Water Rates, Water System Operations, and Financial Information* survey. This survey facilitates a pre-screening survey that estimates the volume and percent of unaccounted-for-water for each retail water agency in the county. In 2009, the percent of unaccounted-for-water for SCWD was 2.2%. Therefore, a full-scale audit is not required.

Leak Detection and Repair Program - As part of the monthly meter reading process, SCWD staff checks for any signs of water leaks at the meter along with a visual system check. As part of the billing process water consumption is compared to prior months and years usage. If a leak is evident on the customer's side of the meter, the customer is notified of the leak either in person on their bill or both depending on the severity of the leak. Due to budgetary constraints water audits are site specific and are conducted when there appears to be a reason to do so. SCWD continues to review system integrity at all times and conducts in house leak detection and also contracts for outside leak detection services on an as needed basis.

SCWD has not developed a formal methodology to estimate the water savings attributable to this DMM. There are, however, real water savings as a result of the proactive pre-screening leak detections and repair program which maintains an acceptable non-revenue water of 2.2%.

4.2.4. DMM 4: Metering with Commodity Rates

All of SCWD's existing connections are metered. SCWD requires individual metering for all new connections and bills monthly by volume-of-use. SCWD employs a five-tier increasing block rate structure for single-family residence as described in Section 4.2.11 below. At this time, there is no formal evaluation to determine the efficacy of this DMM.

4.2.5. DMM 5: Large Landscape Conservation Programs and Incentives

SCWD continues to offer landscape water use surveys to CII customers with mixed-used meters. As of 2008, 103 landscape surveys were offered and 83 surveys were completed.

SCWD also participates in large landscape conservation through MWDOC's regional programs. MWDOC offers several landscape water use efficiency program aimed at both residential and commercial customers as described under DMM 1. MWDOC also offers programs in Orange County to specifically assist retail agencies and their large landscape customers to use water efficiently as follows:

Landscape Performance Certification Program (LPCP) – Started in 2004, the LPCP program is a free water management training program sponsored by MWDOC and Metropolitan and offered to CII customers with dedicated irrigation meters. The program also helps create site specific water budgets and track monthly water use for each participating site. As of FY 2010-11, a total of 108 landscape meters are participating in this program within SCWD's service area representing a water savings is 268 acre-feet.

California Friendly Landscape Training (Professional) - The California Friendly Landscape Training provides education to residential homeowners and professional landscape contractors on a variety of landscape water efficiency practices they can employ. These classes are hosted by MWDOC and/or the retail agencies to encourage participation across the county. The Professional Training Program course consists of four consecutive classes in landscape water management, each building upon principles presented in the preceding class. Each participant receives a bound handbook containing educational materials for each class. These classes are offered throughout the year and taught in both English and Spanish languages.

In addition, SCWD takes advantage of regional and local efforts which target and market to large landscape properties including bill inserts, direct marketing efforts, ads in various publications, educational seminars/symposiums for property owners, and presentations at Homeowners Associations (HOAs) board meetings.

Tri-Cities H2O for HOAs Water Forum – This innovative program is a collaborative effort between SCWD and the Cities of Dana Point, San Juan Capistrano, and San Clemente to educate HOA board members, property managers, and landscape contractors about proper irrigation and landscape management. This is an annual event that began in 2007 and attracts over 100 participants who directly manage the large landscapes in our communities. Participants receive the latest information on water efficient technologies and rebates, local water conservation and storm water prevention ordinances, and efficient landscape and irrigation design. Surveys indicate the participants, specifically the HOA board members, come away from this event more educated about how to sustainably manage their landscape and are enlightened on how to invest more resources, such as installing weather-based irrigation controllers, into conserving water.

4.2.6. DMM 6: High-Efficiency Washing Machine Rebate Programs

SCWD participates in the SoCal Water Smart residential rebate program offered by Metropolitan. This program offers financial incentives to single-family and multifamily residential customers through the form of a rebate.

Orange County residents are eligible to receive an \$85 rebate when they purchase of a new High Efficiency Clothes Washer (HECW). This program began in 2001 and is sponsored by MWDOC, Metropolitan, and local retail water agencies. Rebates are available on a first-come, first-served basis, while funds last. Metropolitan recently ended this program in 2011. Applications must have been postmarked by December 6, 2010 to qualify for a rebate. Participants must be willing to allow an inspection of the installed machine for verification of program compliance. To qualify for a rebate, the HECW must have a water factor of 4.0 or less. An HECW with a water factor of 4 will use approximately 15 gallons of water per load compared to a conventional top-loading clothes washer which can use 40 gallons or more per load. Depending on use, these machines can save 10,000 gallons of water per year. Participants are encouraged to contact their local gas and/or electric utility as additional rebates may be available. As of FY 2010-11, 987 HECWs have been installed in single and multi-family homes within the SCWD's service area through this program. These retrofits have saved over 117 acre feet of potable water over the program's lifetime.

4.2.7. DMM 7: Public Information Programs

Water conservation continues to be the main message of public information and outreach programs throughout SCWD. SCWD has been implementing a range of public outreach programs and activities. While, there is no method to evaluate the water savings attributable to this DMM, SCWD will continue to administer this DMM for its ability to educate and interact with customers.

SCWD's Local Public Information Programs

Community Outreach:

- Annually, SCWD participates in up to eight community events in the service area that conservatively provide approximately 2,000 adults with conservation information, reminders, tips and useful items for use at home or at work.
- SCWD provides useful water conservation items to local civic and non-profit organizations in its service area.
- SCWD provides automatic shut off hose nozzles free of charge to every household upon request, maximum of 2 per household.

Stakeholder Outreach:

- SCWD was a founding member in 2005 of the Tri-City Water Savers group, consisting of the Cities of Dana Point, San Clemente, San Juan Capistrano and SCWD. Over the past five years, SCWD has actively participated in organizing and implementing three H2O for HOA Forums that reached approximately 300 stakeholders, as well as rainwater harvesting workshop, professional landscaping workshops, H2O for Plumbers Forum and H2O for Hospitality Workshop. The team sponsored development of the “water” section of the new Ecology Center’s website. In 2010, the team won the southern CA APWA annual award for creativity and innovation.
- SCWD has funded, promoted and launched in 2009 three customized conservation programs for restaurants (Water Upon Request), hotels/motels (towel/linen reuse) and large irrigators. Since then xx% restaurants in the service area are using SCWD produced table tent cards and/or menu stickers in support of the Water Upon Request program; xx% hotels/motels are using Met/MWDOC table, bed and/or towel rack cards in support of the reuse message.
- SCWD has funded, promoted and launched a multi-family toilet replacement program aimed at replacing toilets greater than 1.6 gallons per flush with HETs.

Public Information:

- The SCWD website contains information about water conservation and water supply, which is updated and added to on a regular basis. The Water Conservation section has been revised since the last UWMP. We have developed and posted Water Conservation “Checklists” for Irrigation, Outdoor and Indoor water use. MWDOC/Met and SCWD rebate programs are promoted on the website. It provides a Designated Water Days map for residents by area for sprinkler use during a Water Supply Alert.
- SCWD ran a series of public presentations on its proposed Water Conservation & Water Supply Shortage Ordinance, securing input and feedback on the proposed

program, which were considered and included in the final ordinance, as applicable. The presentations, which were part of board meetings, could be viewed on the local cable channel (live and recorded) as well as on SCWD's website, where they are still archived. When the Board declared a Level 1 Water Supply Alert, it was broadcast and available on our website as well. Water Conservation measures that are required year-round, and during a water supply alert, warning or emergency are posted in total and in summary form. Local media covered the ordinance development and approval and the declaration of the Water Supply Alert.

- SCWD, in conjunction with the City of Dana Point, writes a monthly column in the Dana Point Times about water conservation and prevention of urban runoff. It has been running since 2008 and has covered topics from "Water Conservation is the Foundation" to "No Doubt, Still A Drought."

Customer Information:

- SCWD provides MWDOC-produced and self-produced inserts in its bills that promote water conservation and highlight water supply/drought issues. In addition, SCWD is providing messages imprinted on its bills.
- SCWD mails letters to customers on key conservation topics, in addition to bill messages. For example, three letters regarding Ordinance 206 and the declared Water Supply Alert went to customers from July – November 2009. Customized South Orange County SmartScape Program promotional flyers for SCWD use. In 2010, direct mail pieces went to top water-using single-family residents promoting the South Orange County SmartScape Program. A direct mail piece is targeted to multi-family residents cross-promoting SmartScape, Turf Removal Rebates and a new Toilet Replacement program.
- Since December 2009, SCWD has distributed a Water Conservation courtesy notice to residents and businesses that are observed as not complying with Permanent or Water Supply Alert requirements. The door hanger is used as much as an educational piece and personnel follow up by phone and/or in person with the customer. Since the program's inception, 372 courtesy notices have been distributed.
- SCWD completed an AMR (Automated Meter Reading) water meter replacement project in October 2010. The project consisted of the replacement and conversion of existing manually read meters to automated read meters. The automated read meters are a radio device transmitter on the meter that allows for the transmission of the read to a laptop computer and ultimately the billing system. SCWD began with a pilot project in late 2006 that was very successful. 2218 meters had AMR devices. SCWD converted all the remaining 1095 meters to automated read device meters by October 31, 2009.

- The conversion to automated meter read devices enabled SCWD to move from bi-monthly to monthly billing by August 2009, without increasing staff. All 12,313 meters can be read in less than half the time of the manual read meters. This has assisted customers with conservation by providing them with the following tools: 1) Monthly consumption billing; 2) Hourly water usage reports upon requests; and 3) A Water Meter Monitor to install in the home upon request. Both SCWD and the customers will have the tools for conservation once all meters are converted to automated meter read devices. This AMR project was possible with the use of the Badger Meters and the Badger Orion Meter Reading Software and the Qesta billing system software.

Special Initiatives:

- SCWD has funded, promoted and launched in 2009 two turf removal programs: California-friendly plant rebate program and the Synthetic Turf rebate program. To date, 34 have participated in both programs, Promotion has occurred through media coverage, bill messages, and event flyers. In 2010, the program expanded from SFR to all customers
- In addition, SCWD has developed a custom presentation, shown on local cable TV and on our website, entitled: Saving Earth One Yard At A Time: Discovering the New World of Water-Smart, Eco-Friendly Landscaping. SCWD board and staff members visited Conservation Gardens at Cuyamaca College, securing information and photos used in the presentation.
- SCWD researched and installed a Demonstration Garden in 2010 of native and California-Friendly plants, located at its Groundwater Recovery Facility.
- Over the past five years, SCWD has organized and implemented annual Home Gardening Workshops for residents in the community, reaching a total of more than 200 individuals one-on-one. It is promoted in local media and at events.

Coordinate with Other Government Agencies

SCWD participates in MWDOC's regional Water Use Efficiency and Public Affairs Workgroups. These meetings facilitate increased communication and shared resources with other Orange County agencies. As discussed in Section 4.2.5, the Tri-Cities groups collaborate on many public outreach and education projects which target select groups. For example, the H2O for HOA's Water Forum targets HOA board members, property managers, and local landscape contractors while the H2O for Hospitality Water Forum targets owners and managers of hotels and restaurants to go over conservation-related BMP's for their related industry, trade and responsibility.

MWDOC's Regional Public Information Programs

MWDOC currently offer a wide range of public information programs in Orange County in collaboration with its member agencies including SCWD. Current regional public information programs within the MWDOC's service area are summarized below.

Water Facility Inspection Trip Program - The inspection trip program is sponsored by MWDOC and Metropolitan. Each year, Orange County elected officials, residents, business owners, and community leaders are invited to attend educational inspection trips to tour key water facilities throughout the state of California. The goal is to educate members of our community about planning, procurement and management of southern California's water supply and the issues surrounding delivery and management of this vital resource.

O.C. Water Hero Program - The goal of this program is to engage children in water use efficiency activities while facilitating discussion with friends and family members about how to save water. Any Orange County child can become a Water Hero by pledging to save 20 gallons of water per day. In exchange for their pledge, they receive a free Water Hero kit, which includes a variety of fun, water-saving items like a 5-minute shower timer and "fix-it" ticket pad for busting water wasters. To become a Superhero, a student must get their parents to also pledge to save 20 gallons of water per day. To date, more than 13,000 children in Orange County have become Water Heroes and more than 4,000 have become Superheroes.

eCurrents - This monthly electronic newsletter is designed to keep MWDOC's 28 member agencies, residents and businesses, stakeholder groups, opinion leaders, and others apprised of MWDOC news, programs, events, and activities. The publication also serves to keep readers informed about regional, state, and federal issues affecting water supply, water management, water quality, and water policy and regulation.

Water Advisory Committee of Orange County (WACO) - WACO was formed in 1983 to facilitate the introduction, discussion, and debate of current and emerging water issues among Orange County policymakers and water professionals. The committee's membership has evolved to include elected officials and management staff from Orange County cities and water districts, engineers, attorneys, consultants, and other industry professionals. Monthly meetings are open to the public and are typically held on the first Friday of each month at 7:30 a.m.

4.2.8. DMM 8: School Education Programs

SCWD and MWDOC have implemented this BMP aggressively. MWDOC's regional water education program began in 1973 and provides water education to Orange County students in grades kindergarten through high school. The program teaches students about

the water cycle, the importance and value of water and water conservation. While it is not feasible for SCWD to evaluate the water savings of this DMM, SCWD will continue to consider this DMM as vital and necessary.

MWDOC's Regional School Education Programs

One of the most successful and well-recognized water education curriculums in Southern California is MWDOC's Water Education School Program. For more than 30 years, School Program mascot "Ricki the Rambunctious Raindrop" has been educating students in grades K-5 about the water cycle, the importance and value of water, and the personal responsibility we all have as environmental stewards.

The School Program features assembly-style presentations that are grade-specific and performed on-site at the schools. The program curriculum is aligned with the science content standards established by the State of California. Since its inception in 1973, nearly three million Orange County students have been educated through the School Program.

In 2004, MWDOC formed an exciting partnership with Discovery Science Center that has allowed both organizations to reach more Orange County students each year and provide them with even greater educational experiences in the areas of water and science. Discovery Science Center currently serves as the School Program administrator, handling all of the program marketing, bookings, and program implementation. During the 2010-11 school year, more than 70,000 Orange County students will be educated through the program.

Since the last UWMP, SCWD has increased the number of elementary schools and students (K-5) participating in the MWDOC/Discovery Center Water Education Assemblies. On average, we are now reaching up to 1,500 students per year.

SCWD's Local School Education Program

Annually, SCWD presents at the Ocean Institute's Kid's Water Conference - Using Water Wisely & Keeping the Ocean Clean: What's The Connection. It is followed by a tap water versus bottled water blind taste test. Approximately 200 fifth graders attend from local schools every year.

Annually, SCWD participates in a South Orange County Earth Day program that reaches approximately 500 middle school students in our service providing them with water conservation information and useful tips and items.

SCWD has participated in Summer Water Camp sponsored by MWDOC. SCWD's water conservation/supply presentation, followed by a competitive Water Jeopardy Game, has reached approximately 300 students in the last five years.

In addition, SCWD continues to sponsor its annual Water Scholarship for college-bound graduating high school seniors who live in our service area. The \$500 scholarships (up to 3 per year) are promoted in private and public high schools in the area and require applicants to write an essay on a water-related topic provided. Since the program began in 2001, SCWD has awarded 29 scholarships for a total of \$14,500.

4.2.9. DMM 9: Conservation Programs for Commercial, Industrial and Institutional Accounts

SCWD has met the CUWCC BMP requirement for ranking consumption by CII accounts, with the understanding that SCWD has no industrial accounts. While, SCWD has not conducted surveys, it continues to work with MWDOC to provide incentives to CII customers to promote water conservation in this sector. SCWD offers financial incentives under the Save Water Save A Buck Rebate Program which offers rebates for various water efficient devices to CII customers. SCWD also participates in MWDOC's Water Smart Hotel Program as described below.

Save Water Save a Buck – This program began in 2002 and offers rebates to assist commercial, industrial, and institutional customers in replacing high-flow plumbing fixtures with low-flow fixtures. Facilities where low-flow devices are installed must be located in Orange County. Rebates are available only on those devices listed in Table 4-3 below and must replace higher water use devices. Installation of devices is the responsibility of each participant. Participants may purchase and install as many of the water saving devices as is applicable to their site.

Table 4-3: Retrofit Devices and Rebate Amounts Available Under Save Water Save a Buck Program

| Retrofit Device | Rebate Amount |
|---------------------------------------|-----------------------|
| High Efficiency Toilet | \$50 |
| Ultra-Low-Water or Zero Water Urinal | \$200 |
| Connectionless Food Steamers | \$485 per compartment |
| Air-Cooled Ice Machines (Tier III) | \$300 |
| Cooling Tower Conductivity Controller | \$625 |
| pH / Conductivity Controller | \$1,750 |
| Dry Vacuum Pumps | \$125 per HP |
| Water Pressurized Broom | \$110 |

As of FY 2010/11, SCWD's CII customers have installed a total of 284 water-saving fixtures representing a water savings of 136 acre-feet. SCWD will continue to educate CII customers to meet the DMM requirements.

Water Smart Hotel Program – In 2008 and 2009, MWDOC received grants from DWR and the US Bureau of Reclamation (USBR) to conduct the Water Smart Hotel Program, a program designed to provide Orange County hotels and motels with commercial and landscape water saving surveys, incentives for retrofits and customer follow-up and support. The goal of the program is to implement water use efficiency changes in hotels to achieve an anticipated water savings of 7,078 acre feet over 10 years.

The Program is offered to hotels in MWDOC's service area as identified by retail water agencies to date 6 major hotels have participated in the program within SCWD's service area. It is anticipated that detailed survey of the indoor and outdoor water using aspects of up to 105 participating hotels will be performed. Participating hotels will receive survey reports that recommend indoor and outdoor retrofits, upgrades, and other changes that should, based on the survey, result in significant water savings. Quantities of each device and associated fixture and installation costs, water savings and payback information (based on rebate amount Incentives offered through the Save Water Save A Buck Rebate Program will be augmented using DWR and USBR Water Use Efficiency grant funds to bridge the gap between existing incentives and the actual costs of Hotel Water Survey recommendations. To date, over 24 surveys have been performed county-wide, and over 9,500 water-saving devices have been installed through the program. These devices are saving 351 acre feet per year or 3,510 acre feet over the ten year device life.

4.2.10. DMM 10: Wholesale Agency Programs

This BMP pertains to wholesale agency programs which are not applicable to SCWD, a retail agency. SCWD is a member agency of MWDOC, the region's wholesaler that is responsible for the implementation and reporting requirements of this DMM.

4.2.11. DMM 11: Conservation Pricing

SCWD employs a five-tier increasing block water rate structure. Table 4-4 summarizes SCWD's current water rates

Table 4-4: SCWD Current Water Rates

| WATER SERVICE CHARGE - ANNUAL (ALL CUSTOMERS) | Annual Charge |
|--|------------------------|
| Meter Size | |
| 5/8" - 3/4" and smaller | \$235.95 |
| 1" | \$589.87 |
| 1 1/2" | \$1,179.75 |
| 2" | \$1,887.59 |
| 3" | \$3,539.24 |
| 4" | \$7,078.48 |
| 6" | \$11,797.47 |
| Water Usage Charge - Single Family Residential | per CCF |
| Consumption Range | |
| 1 to 5 units | \$1.52 |
| 6 to 13 units | \$3.04 |
| 14 to 25 units | \$4.56 |
| 26 to 62 units | \$6.08 |
| 63 + units | \$7.60 |
| WATER USAGE CHARGE - Commercial & Multi-Residential | per CCF |
| | \$3.42 |
| POTABLE IRRIGATION WATER USAGE CHARGE - Dedicated Irrigation Meters | per CCF |
| Consumption based on historical 5 year rolling average | |
| Tier 1 / all units up to 75% | \$3.04 |
| Tier 2 / all units up to 100% | \$4.56 |
| Tier 3 / all units over 100% | \$4.56 |
| and all units over to 100% | \$6.08 |
| RECYCLED WATER USAGE CHARGE - Irrigation | Monthly per CCF |
| | \$3.08 |

SCWD has not conducted an evaluation of the water savings attributable to this DMM, however, SCWD will continue to make customers aware of the rate structure and use it as a tool to affect water conservation.

4.2.12. DMM 12: Water Conservation Coordinator

SCWD's Reclamation and Conservation Supervisor acts as the Water Conservation Coordinator. The position was created in 1995. The conservation coordinator is responsible for coordinating all conservation program activities and acts as a liaison with MWDOC, Metropolitan, CUWCC, County and State Health Departments and others. The Conservation Coordinator:

- Implements, administers, and promotes all of SCWD's water conservation programs and activities including identification, evaluation, and implementation of measures and practices to the essential use of potable or recycled water to include BMPs.
- Develops informational resources on water conservation, prepares reports and publications in accordance with state requirements.
- Gathers analyzes, and interprets data and information related to water use. Informs and educates the public regarding water conservation issues.
- Represents SCWD in coordination with other utilities, regulatory agencies, governmental bodies, planning agencies, trade and technical groups, and professional associations.

4.2.13. DMM 13: Water Waste Prohibition

In 2009, the Board of Directors adopted Water Conservation and Water Supply Shortage Ordinance 206 (Appendix D). This ordinance constitutes permanent mandatory conservation requirements for all water users and additional requirements for commercial water users. Voluntary supplemental conservation measures for all water users were also established. Additionally, Ordinance 206 establishes three water supply shortage response levels as described in Section 5.

SCWD has not conducted an evaluation of the water savings attributable to this DMM.

4.2.14. DMM 14: Residential Ultra-Low-Flush Toilet Replacement Programs

Over the past 19 years, MWDOC has continuously implemented a regional ULFT Rebate and/or Distribution Program targeting single- and multi-family homes in Orange County. Since the end of distribution program in 2004, MWDOC's program has focused solely on providing rebate incentives for retrofitting non-efficient devices with either ULFTs or High Efficiency Toilets (HETS) – toilets using 1.28 gallons per flush or less. The ULFT portion of this program concluded in June 2009, and over 360,000 ULFTs were replaced in single family and multi-family homes, with an overall program to date savings of approximately 138,457 acre feet of water. The HET rebate program, which concluded in 2010, has incentivized over 26,000 devices, with an overall program to date savings of approximately 3,419 acre-feet.

SCWD has participated in this program from the beginning. To date 2,305 ULFTs and 179 HETs have been installed within SCWD's service area representing a combined water savings of 859 acre-feet. SCWD has met the CUWCC BMP coverage requirements for this DMM.

5. Water Supplies Contingency Plan

5.1. Overview

Recent water supply challenges throughout the American Southwest and the State of California have resulted in the development of a number of policy actions that water agencies would implement in the event of a water shortage. In southern California, the development of such policies has occurred at both the wholesale and retail level. This section describes how new and existing policies that Metropolitan, MWDOC and SCWD have in place to respond to water supply shortages, including a catastrophic interruption and up to a 50 percent reduction in water supply.

5.2. Shortage Actions

Metropolitan

As an importer of water from multiple sources, including both the Colorado River and Northern California, a number of water supply challenges have impacted the reliability of Metropolitan's imported supplies. In response to these challenges, Metropolitan has implemented existing policies as well as developed new ones.

The first action that Metropolitan implements in the event of a water shortage is the suspension and/or reduction of its interruptible supplies, which are supplies sold at a discount in return for the buyers agreeing to be the first to be cutback in the event of a shortage. Metropolitan currently has two interruptible programs for agricultural users and groundwater replenishment, under which supplies were either suspended or reduced in 2007.

In addition, in preparation for the possibility of being unable to meet "firm demands" (non-interruptible supplies) of its member agencies, in February 2008, the Metropolitan's Board of Directors (Board) adopted the Water Supply Allocation Plan (WSAP), which was subsequently updated in June 2009.

Metropolitan's plan includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering an allocation. Metropolitan's WSAP is the foundation for the urban water shortage contingency analysis required under Water Code Section 10632 and is part of Metropolitan's 2010 RUWMP.

Metropolitan's WSAP was developed in consideration of the principles and guidelines described in Metropolitan's 1999 Water Surplus and Drought Management Plan

(WSDM), with the objective of creating an equitable needs-based allocation. The plan's formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of Metropolitan supplies of up to 50 percent. The formula takes into account: impact on retail customers and the economy; growth and population; changes in supply conditions; investments in local resources; demand hardening aspects of non-potable recycled water use; implementation of conservation savings program; participation in Metropolitan's interruptible programs; and investments in facilities.

The formula is calculated in three steps: based period calculations, allocation year calculations, and supply allocation calculations. The first two steps involve standard computations, while the third section contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations – The first step in calculating a water supply allocation is to estimate water supply and demand using a historical based period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the three most recent non-shortage years, 2004-2006.

Step 2: Allocation Year Calculations – The next step in calculating the water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population or economic growth and changes in local supplies.

Step 3: Supply Allocation Calculations – The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. Each element and its application in the allocation formula are discussed in detail in Metropolitan's WSAP.

In order to implement the WSAP, the Metropolitan Board makes a determination on the level of the regional shortage, based on specific criteria, in April each year. If it is determined allocations are necessary, they go into effect in July for that year and remain for a 12-month period, although the schedule is at the discretion of Metropolitan's Board.

Metropolitan's 2010 RUWMP forecasts that Metropolitan will be able to meet projected firm demands throughout the forecast period from 2015 to 2035. However, these projections do not mean that Metropolitan would not implement its WSAP during this period.

MWDOC

To prepare for the potential allocation of imported water supplies from Metropolitan, MWDOC worked collaboratively with its 28 member agencies to develop its own Water Supply Allocation Plan (MWDOC WSAP), adopted January 2009, to allocate imported water supplies at the retail level. The MWDOC WSAP lays out the essential components of how MWDOC will determine and implement each member agency's allocation during a time of shortage.

The MWDOC WSAP uses a similar method and approach, when reasonable, as that of the Metropolitan's WSAP. However, MWDOC's plan remains flexible to use an alternative approach when Metropolitan's method produces a significant unintended result for the member agencies. The MWDOC WSAP model follows five (5) basic steps to determine a retail agency's imported supply allocation.

Step 1: Determine Baseline Information – The first step in calculating a water supply allocation is to estimate water supply and demand using a historical based period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the last three non-shortage years – calendar years, 2004, 2005, and 2006.

Step 2: Establish Allocation Year Information – In this step, the model adjusts for each member agency's water need in the allocation year. This is done by adjusting the base period estimates for increased retail water demand based on growth and changes in local supplies.

Step 3: Calculate Initial Minimum Allocation Based on Metropolitan's Declared Shortage Level – This step sets the initial water supply allocation for each member agency. After a regional shortage level is established, MWDOC will calculate the initial allocation as a percentage of adjusted Base Period Imported water needs within the model for each member agency.

Step 4: Apply Allocation Adjustments and Credits in the Areas of Retail Impacts, Conservation, and the Interim Agriculture Water Program – In this step, the model assigns additional water to address disparate impacts at the retail level caused by an across-the-board cut of imported supplies. It also applies a conservation credit given to those agencies that have achieved additional water savings at the retail level as a result of successful implementation of water conservation devices, programs and rate structures.

Step 5: Sum Total Allocations and Determine Retail Reliability – This is the final step in calculating a retail agency's total allocation for imported supplies. The model sums an agency's total imported allocation with all of the adjustments and credits and then calculates each agency's retail reliability compared to its Allocation Year Retail Demand.

The MWDOC WSAP includes additional measures for plan implementation, including the following:

- **Appeal Process** – An appeals process to provide member agencies the opportunity to request a change to their allocation based on new or corrected information. MWDOC anticipates that under most circumstances, a member agency's appeal will be the basis for an appeal to Metropolitan by MWDOC.
- **Melded Penalty Rate Structure** – At the end of the allocation year, MWDOC would only charge a penalty to each member agency that exceeded their allocation if MWDOC exceeds its total allocation and is required to pay a penalty to Metropolitan. Metropolitan enforces allocations to member agencies through a tiered penalty rate structure: penalty rates to a member agency that exceeds its total annual allocation at the end of the twelve-month allocation period, according to a specified rate structure. MWDOC's penalty would be assessed according to the member agency's prorated share (acre-feet over usage) of MWDOC penalty amount with Metropolitan. Penalty funds collected by Metropolitan will be invested in water conservation and local resource development.
- **Tracking and Reporting Water Usage** – MWDOC will provide each member agency with water use monthly reports that will compare each member agency's current cumulative retail usage to their allocation baseline. MWDOC will also provide quarterly reports on its cumulative retail usage versus its allocation baseline.
- **Timeline and Option to Revisit the Plan** – The allocation period will cover 12 consecutive months and the Regional Shortage Level will be set for the entire allocation period. MWDOC only anticipates calling for allocation when Metropolitan declares a shortage; and no later than 30 days from Metropolitan's declaration will MWDOC announce allocation to its member agencies.

Due to the complexity of calculating allocations and the potential for unforeseen circumstances that may occur during an allocation year, after one year of implementation, MWDOC staff and member agencies have the opportunity to make recommendations to the MWDOC Board that will improve the method, calculation, and approach of the MWDOC WSAP.

SCWD

The SCWD Board of Directors adopted Water Conservation and Water Supply Shortage Ordinance No. 206 on April 23, 2009, which established a staged water conservation program that will encourage reduced water consumption within SCWD through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within SCWD. Along with permanent water conservation requirements, SCWD's Water

Conservation and Water Supply Shortage program consists of the following four stages found in Table 5-1 to respond to a reduction in potable water available to SCWD for distribution to its customers with Stage 1 in effect at all times unless a mandatory conservation stage has been implemented by the Board of Directors.

Table 5-1: Water Supply Shortage Stages and Conditions – Rationing Stages

| Stage No. | Water Supply Conditions | % Shortage |
|--------------------------------|---|------------|
| Voluntary Water Supply Watch | District Board of Directors determines that it is desirable to put the public on notice of a potential or planned water shortage that could result in reduced imported water supplies to SCWD and/or to encourage the public to supplement year-round mandatory water conservation measures with voluntary conservation measures focused on outdoor water-use efficiency. | |
| Level 1 Water Supply Alert | SCWD experiences up to a 20% shortage in imported water supplies and/or determines the need to further reduce consumer usage by up to 20%. | 0-20% |
| Level 2 Water Supply Warning | SCWD experiences up to a 40% shortage in imported water supplies and/or determines the need to further reduce consumer usage by up to 40%. | 20-40% |
| Level 3 Water Supply Emergency | SCWD experiences more than a 40% shortage in imported water supplies and/or determines the need to further reduce consumer usage by up to 40%. | >40% |

5.3. Three-Year Minimum Water Supply

As a matter of practice, Metropolitan does not provide annual estimates of the minimum supplies available to its member agencies. As such, Metropolitan member agencies must develop their own estimates for the purposes of meeting the requirements of the Act.

Section 135 of the Metropolitan Water District Act declares that a member agency has the right to invoke its “preferential right” to water, which grants each member agency a preferential right to purchase a percentage of Metropolitan’s available supplies based on specified, cumulative financial contributions to Metropolitan. Each year, Metropolitan calculates and distributes each member agency’s percentage of preferential rights. However, since Metropolitan’s creation in 1927, no member agency has ever invoked these rights as a means of acquiring limited supplies from Metropolitan.

As an alternative to preferential rights, Metropolitan adopted the Water Shortage Allocation Plan (WSAP) in February 2008. Under the WSAP, member agencies are allowed to purchase specified level of supplies without the imposition of penalty rates. The WSAP uses a combination of estimated total retail demands and historical local supply production within the member agency service area to estimate the firm demands on Metropolitan from each member agency in a given year. Based on a number of factors, including storage and supply conditions, Metropolitan then determines whether it has the ability to meet these firm demands or will need to allocate its limited supplies among its member agencies. Thus, implicit in Metropolitan's decision not to implement an allocation of its supplies is that at a minimum Metropolitan will be able to meet the firm demands identified for each of the member agencies.

In order to estimate the minimum available supplies from Metropolitan for the period 2011-2013, an analysis was performed to assess the likelihood that Metropolitan would re-implement mandatory water use restrictions in the event of a 1990-92 hydrology over this period. Specific water management actions during times of water shortage are governed by Metropolitan's Water Shortage and Drought Management Plan (WSDM Plan). Adopted by the Metropolitan Board in 1999, the WSDM Plan provides a general framework for potential storage actions during shortages, but recognizes that storage withdrawals are not isolated actions but part of a set of resource management actions along with water transfers and conservation. As such, there are no specific criteria for which water management actions to take at specific levels of storage. The implementation of mandatory restrictions is solely at the discretion of the Metropolitan Board and there are no set criteria that require the Board to implement restrictions. Given these conditions, the analysis relies upon a review of recent water operations and transactions that Metropolitan has implemented during recent drought.

The first step in the analysis was a review of projected SWP allocations to Metropolitan, based on historical hydrologies. As with the recent drought, potential impacts to SWP supplies from further drought and the recently implemented biological opinions are anticipated to be the biggest challenges facing Metropolitan in the coming three years.

A review of projected SWP allocations from the DWR's State Water Project Delivery Reliability Report 2009 (2009 SWP Reliability Report) was made to estimate a range of conservative supply assumptions regarding the availability of SWP supplies. The 2009 SWP Reliability Report provides estimates of the current (2009) and future (2029) SWP delivery reliability and incorporates regulatory requirements for SWP and CVP operations in accordance with USFWS and NMFS biological opinions. Estimates of future reliability also reflect potential impacts of climate change and sea level rise.

The analysis assumes a maximum SWP allocation available to Metropolitan of 2,011,500 AF and a Metropolitan storage level of 1,700,000 AF at 2010 year-end. The analysis also

assumes a stable water supply from the Colorado River in the amount of 1,150,000 AF through 2015. Although the Colorado River watershed has also experienced drought in recent years, Metropolitan has implemented a number of supply programs that should ensure that supplies from this source are relatively steady for the next three years. Based on estimated “firm” demands on Metropolitan of 2.12 MAF, the annual surplus or deficit was calculated for each year of the three-year period.

A review of recent Metropolitan water management actions under shortage conditions was then undertaken to estimate the level of storage withdrawals and water transfers that Metropolitan may exercise under the 1990-92 hydrologies were identified. For this analysis, it was assumed that, if Metropolitan storage levels were greater than 2 MAF at the beginning of any year, Metropolitan would be willing to take up to 600 TAF out of storage in that year. Where Metropolitan storage supplies were between 1.2 MAF and 2 MAF at the beginning of the year, it was assumed that Metropolitan would be willing to take up to 400 TAF in that year. At storage levels below 1.2 MAF, it was assumed that Metropolitan would take up to 200 TAF in a given year.

It was also assumed that Metropolitan would be willing to purchase up to 300 TAF of water transfer in any given year. For years where demands still exceeded supplies after accounting for storage withdrawals, transfer purchases were estimated and compared against the 300 TAF limit.

Table 5-2: Metropolitan Shortage Conditions

| Study Year | Actual Year | SWP Allocation (%) | SWP (AF) | CRA (AF) | Total (AF) | Demand (AF) | Surplus/ Shortage (AF) | Storage at YE (AF) | Transfers (AF) |
|------------|-------------|--------------------|----------|-----------|------------|-------------|------------------------|--------------------|----------------|
| 2011 | 1990 | 30% | 603,450 | 1,108,000 | 1,711,450 | 2,124,000 | (400,000) | 1,300,000 | (12,550) |
| 2012 | 1991 | 27% | 542,820 | 1,108,000 | 1,650,820 | 2,123,000 | (200,000) | 1,100,000 | (272,180) |
| 2013 | 1992 | 26% | 522,990 | 1,108,000 | 1,630,990 | 2,123,000 | (200,000) | 900,000 | (292,010) |

Based on the analysis above, Metropolitan would be able to meet firm demands under the driest three-year hydrologic scenario using the recent water management actions described above without re-implementing mandatory water use restrictions on its member agencies. Given the assumed absence of mandatory restrictions, the estimated minimum imported water supplies available to MWDOC from Metropolitan is assumed to be equal to Metropolitan’s estimate of demand for firm supplies for MWDOC, which Metropolitan uses when considering whether to impose mandatory restrictions. Thus, the estimate of the minimum imported supplies available to MWDOC is 261,577 AF⁴.

MWDOC also has also adopted a shortage allocation plan and accompanying allocation model that estimates firm demands on MWDOC. Assuming MWDOC would not be

⁴ Metropolitan 2010/11 Water Shortage Allocation Plan model (March 2011)

imposing mandatory restrictions if Metropolitan is not, the estimate of firms demands in MWDOC's latest allocation model has been used to estimate the minimum imported supplies available to each of MWDOC's customer agencies for 2011-13. Thus, the estimate of the minimum imported supplies available to SCWD is 6,925 AF⁵.

As captured in its 2010 RUWMP, Metropolitan believes that the water supply and demand management actions it is undertaking will increase its reliability throughout the 25-year period addressed in its plan. Thus for purposes of this estimate, it is assumed that Metropolitan and MWDOC will be able to maintain the identified supply amounts throughout the three-year period.

Metropolitan projects that it will meet full service demands through the year 2035. Additionally, local supplies are projected to be maintained at demand levels. Based on the MWDOC Water Supply Allocation Plan, SCWD is expected to fully meet demands for the next three years assuming Metropolitan and MWDOC are not in shortage and zero allocations are imposed for Imported Supplies. The Three Year Estimated Minimum Water Supply is listed in Table 5-3.

Table 5-3: Three-Year Estimated Minimum Water Supply (AFY)

| Source | Year 1 | Year 2 | Year 3 |
|--------------|--------------|--------------|--------------|
| Local | 650 | 650 | 650 |
| Imported | 6,925 | 6,925 | 6,925 |
| <i>Total</i> | <i>7,575</i> | <i>7,575</i> | <i>7,575</i> |

5.4. Catastrophic Supply Interruption

Given the great distances that imported supplies travel to reach Orange County, the region is vulnerable to interruptions along hundreds of miles aqueducts, pipelines and other facilities associated with delivering the supplies to the region. Additionally, this water is distributed to customers through an intricate network of pipes and water mains that are susceptible to damage from earthquakes and other disasters.

Metropolitan

Metropolitan has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM and WSAP Plans. Metropolitan also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the

⁵ MWDOC Water Shortage Allocation model (August 2010)

southern California region, including seismic events along the San Andreas Fault. In addition, Metropolitan is working with the State to implement a comprehensive improvement plan to address catastrophic occurrences that could occur outside of the Southern California region, such as a maximum probable seismic event in the Delta that would cause levee failure and disruption of SWP deliveries. For greater detail on Metropolitan's planned responses to catastrophic interruption, please refer to Metropolitan's RUWMP.

Water Emergency Response Organization of Orange County

In 1983, the Orange County water community identified a need to develop a plan on how agencies would respond effectively to disasters impacting the regional water distribution system. The collective efforts of these agencies resulted in the formation of the Water Emergency Response Organization of Orange County (WEROC) to coordinate emergency response on behalf of all Orange County water and wastewater agencies, develop an emergency plan to respond to disasters, and conduct disaster training exercises for the Orange County water community. WEROC was established with the creation of an indemnification agreement between its member agencies to protect each other against civil liabilities and to facilitate the exchange of resources. WEROC is unique in its ability to provide a single point of contact for representation of all water and wastewater utilities in Orange County during a disaster. This representation is to the county, state, and federal disaster coordination agencies. Within the Orange County Operational Area, WEROC is the recognized contact for emergency response for the water community.

SCWD

SCWD relies on imported water for the majority of its supply. In the event of a supply interruption in the importation facilities, SCWD's, as well as most of South Orange County's, customers would be greatly impacted. In December of 1999, the AMP unexpectedly ruptured, immediately eliminating a major source of supply to South Orange County. Metropolitan was able to repair the pipeline and restore regular operations within (7) days. It was fortunate that this pipeline failure occurred during the winter in a relatively accessible location. A more difficult pipeline repair or a major failure at the Diemer Filtration Plant could result in an interruption in import supply of far greater than seven days. The Metropolitan Administrative Policy requires its member agencies be able to withstand planned supply shutdowns of at least seven days between the months of October and April. This policy is designed to facilitate Metropolitan's ability to conduct scheduled maintenance of the supply and treatment systems. The 1999 Metropolitan failure made it quite apparent that the agencies in South Orange County that depend on the import supply must plan for unexpected supply interruptions during potential peak demand conditions.

Over the years, SCWD has secured additional connections to the importation system allowing SCWD to be served water from multiple points. SCWD should be able to sustain itself for approximately seven days should there be an interruption in its source of supply. This is an estimate based upon SCWD's normal usage and storage levels with the addition of water conservation measures and the curtailment of potable irrigation. Several factors have a direct bearing upon how long SCWD can survive without additional supplies. These include the weather, time of day, time of year, amount of water actually in storage at the time of the interruption, coincidental firefighting, conservation measures, and the integrity of SCWD's internal distribution system.

Should SCWD incur an internal catastrophe disrupting service within SCWD's boundaries, SCWD has made modifications to its internal distribution system allowing it to flow water in reverse of normal operation to restore service to affected areas. SCWD has constructed numerous interties with its neighboring agencies to allow for emergency water exchanges. Preparation Actions for possible catastrophes are listed in Table 5-4.

Table 5-4: Preparation Actions for Catastrophe

| Possible Catastrophe | Preparation Actions |
|--|---|
| Regional Power Outage | Water Supply Emergency Preparedness Plan, coordination with Water Emergency Response Organization of Orange County (WEROC), construction of numerous interties with neighboring agencies for emergency water exchange |
| Earthquake | |
| Supply Contamination | |
| Terrorist Act which Interrupts Service | |
| Other(s) | |

5.5. Prohibitions, Penalties and Consumption Reduction Methods

Prohibitions

The Water Conservation and Water Shortage Supply Ordinance No. 206 lists water conservation requirements which shall take effect upon implementation by SCWD. These prohibitions shall promote the efficient use of water, reduce or eliminate water waste, complement SCWD's Water Quality regulations and urban runoff reduction efforts, and enable implementation of SCWD's Water Shortage Contingency Measures. Prohibitions include but are not limited to the following restricted activities: outdoor watering, washing of vehicles, washing of hard or paved surfaces, filling or refilling swimming pools and decorative water features, using potable water in construction activities, and serving water in eating or drinking establishments. Additionally, SCWD requires leaks to

be repaired in a time frame relative to each water supply shortage level. The prohibitions and the stages at which they take effect can be found in Table 5-5.

Table 5-5: Mandatory Prohibitions

| Examples of Prohibitions | Stage When Prohibition Becomes Mandatory |
|---|--|
| Watering or irrigating any vegetated area is prohibited any day of the week between 9:00 am and 5:00 pm except by use of a hand held container, hose equipped with an automatic shutoff device, or for the expressed purpose of adjusting or repairing an irrigation system for very short periods of time. | Year Round |
| Outdoor watering cannot result in runoff that enters the street and flows into the nearest storm drain. | Year Round |
| Watering or irrigating any vegetated area with a system that is not continuously attended is limited to no more than ten (10) minutes per valve per cycle. Very low flow drip type systems and systems with weather-based controllers are exempt. | Year Round |
| New residential automated irrigation systems must be equipped with rain sensors, smart controllers or evapotranspiration sensors, or manual control of the on/off function. | Year Round |
| Leaks, breaks, or malfunctions in the user's plumbing, distribution, or irrigation system must be corrected in no more than five (5) days of District notification. | Year Round |
| Hosing or washing down hard or paved surfaces is prohibited except when alleviating safety or sanitary hazards by use of a hand held container, hand held hose equipped with an automatic shutoff device, or a low volume high pressure cleaning machine. | Year Round |
| Hosing or washing down vehicles is prohibited except by use of a hand held container, hand held hose equipped with an automatic shutoff device, a commercial car washing facility, or commercial mobile detailers using their own source of water. | Year Round |
| All decorative fountains and water features must re-circulate water or users must secure a waiver from SCWD. | Year Round |
| No person may sue water from any fire hydrant for any purpose other than fire suppression or emergency aid without first requesting and posting the appropriate fees at SCWD and obtaining a hydrant meter to record all water consumption for a specified project. | Year Round |
| New and existing commercial dedicated potable irrigation systems must be equipped with rain sensors, smart controllers or evapotranspiration sensors, or manual control | Year Round |

| Examples of Prohibitions | Stage When Prohibition Becomes Mandatory |
|--|--|
| of the on/off function. | |
| Eating or drinking establishments are prohibited from providing drinking water unless requested. | Year Round |
| Commercial lodging establishments must provide guests the option of not having used towels and linens laundered. | Year Round |
| Food preparation establishments must use water efficient kitchen spray valves, set scoop sinks at minimum water flow at all times, and use hoses with automatic shutoff devices when hosing or washing. | Year Round |
| All new commercial car wash and laundry facilities and systems must re-circulate the wash water or secure a waiver from SCWD. All existing commercial car wash facilities shall retrofit to systems that re-circulate wash water by January 1, 2012. | Year Round |
| Buildings requesting new water service or being remodeled are prohibited from installing single-pass cooling systems. | Year Round |
| Construction sites must use recycled or non-potable water when available. No potable water may be used for soil compaction of dust control purposes where there is a reasonably available source of recycled or no-potable water approved by the Dept. of Public Health and appropriate for such use. Water hoses shall be equipped with automatic shut off devices, given such devices are available for the size and type of hoses in use. | Year Round |
| Watering of any vegetated area is limited to three (3) days per week from April to October and one (1) day per week from November to March. Exempt from these restrictions is watering with a hand held container, a hand held hose equipped with an automatic shut off device, or low flow drip type irrigation systems. | Level 1 |
| Leaks, breaks, or malfunctions in the user's plumbing, distribution, or irrigation system must be corrected in no more than three (3) days of District notification. | Level 1 |
| Watering of any vegetated area is limited to two (2) days per week from April to October and one (1) day per week from November to March. Exempt from these restrictions is watering with a hand held container, a hand held hose equipped with an automatic shut off device, or low flow drip type irrigation systems. | Level 2 |
| Leaks, breaks, or malfunctions in the user's plumbing, distribution, or irrigation system must be corrected in no more than two (2) days of District notification. | Level 2 |

| Examples of Prohibitions | Stage When Prohibition Becomes Mandatory |
|---|--|
| Filling or refilling ornamental lakes and ponds is prohibited. Ornamental lakes and ponds that sustain actively managed aquatic life of significant value are exempt. | Level 2 |
| Filling or refilling residential pools or spas is prohibited except to maintain water levels by refilling once a month with no more than one foot of water or for individuals with health or medical conditions that find it necessary to refill their pools or spas. | Level 2 |
| Hosing or washing down vehicles is prohibited except at a commercial car washing facility that recycles its water or a commercial mobile detailer that uses its own source of water. | Level 2 |
| Golf courses are required to irrigate with recycled water if determined cost effective by SCWD. | Level 2 |
| Watering is prohibited on any day at any time except for the following: <ul style="list-style-type: none"> • Maintenance of vegetation, trees, and shrubs using a handheld container, hose equipped with an automatic shutoff device, or low flow irrigation systems. • Maintenance of existing landscaping necessary for fire protection and/or erosion control, plant materials identified as rare or essential to the well being of endangered/rare species, public works projects and actively irrigated environmental mitigation projects. | Level 3 |
| Leaks, breaks, or malfunctions in the user's plumbing, distribution, or irrigation system must be corrected in no more than one (1) day of District notification. | Level 3 |
| SCWD will not provide new potable water service, new water meters, or will-serve letters. Will-serve letters will only be issued for the following cases: <ul style="list-style-type: none"> • Projects necessary to protect public health, safety, and welfare. • Projects that have a valid, unexpired City building permit • Projects in which applicants can provide, to the satisfaction of SCWD, substantial evidence of an enforceable commitment that water demands will be offset prior to the provision of a new water meter(s). | Level 3 |

Consumption Reduction Methods

Methods to reduce the use of potable water exist in all Water Shortage Levels. These methods, which can be found in Table 5-6, are expected to reduce consumption up to 40 percent or more.

Table 5-6: Consumption Reduction Methods

| Consumption Reduction Methods | Stage When Method Takes Effect | Projected Reduction (%) |
|-------------------------------|--------------------------------|-------------------------|
| Level 1 Conservation Measures | 1 | 0-20% |
| Level 2 Conservation Measures | 2 | 20-40% |
| Level 3 Conservation Measures | 3 | >40% |

Penalties

Any customer who violates provisions of the Water Conservation and Water Supply Shortage Ordinance by either excess use of water or by specific violation of one or more of the applicable water use restrictions for a particular mandatory conservation stage may be cited by SCWD and may be subject to written notices, surcharges, fines, flow restrictions, disconnection, and termination of service. A description of these penalties and charges is provided in Table 5-7.

Table 5-7: Penalties and Charges

| Penalties or Charges | Stage When Penalty Takes Effect |
|--|---|
| Written Warning | First Instance of Non-Compliance |
| Non-Compliance charge not to exceed one hundred dollars (\$100). | Second Instance of Non-Compliance |
| Non-Compliance charge not to exceed two hundred and fifty dollars (\$250). | Third Instance of Non-Compliance |
| Non-Compliance charge not to exceed five hundred dollars (\$500). | Fourth and Subsequent Instances of Non-Compliance |
| Non-Compliance charge not to exceed two hundred and fifty dollars (\$250). | Second Instance of Non-Compliance for Level 3 Mandatory Water Conservation Measures |
| Non-Compliance Charge not to exceed five hundred dollars (\$500). | Third Instance of Non-Compliance for Level 3 Mandatory Water Conservation Measures |
| Discretionary installation of Water Flow Restrictor Device | In addition to Non-Compliance charges. |
| Disconnection and/or termination of Service | In addition to Non-Compliance charges and installation of a water flow restrictor. |

5.6. Impacts to Revenue

The actions described above to address a range of water shortage conditions have the potential to impact SCWD's revenues and expenditures. To assess these impacts, SCWD calculated the revenue impacts resulting from a 10%, 25% and 50% reduction in sales as compared to a base year that was based on an estimate of normal year baseline. Other factors incorporated into the analysis included water losses, pricing structure and avoided costs. The results of this analysis are shown below in Table 5-8. The rates used for the calculated revenue impacts are proposed rates that will become effective July 1, 2011 if approved.

Table 5-8: Revenue Impacts Analysis

| | Base Year | 10% | 25% | 50% |
|---------------------------------|---------------------|---------------------|---------------------|----------------------|
| Total Consumption (CCF) | 4,412,782 | 3,971,504 | 3,309,587 | 2,206,391 |
| Commodity Revenue | | | | |
| A1 | | | | |
| Tier 1 | \$997,761 | \$897,985 | \$748,320 | \$498,880 |
| Tier 2 | \$2,015,506 | \$1,813,956 | \$1,511,630 | \$1,007,753 |
| Tier 3 | \$1,257,931 | \$1,132,138 | \$943,448 | \$628,965 |
| Tier 4 | \$660,185 | \$594,167 | \$495,139 | \$330,093 |
| Tier 5 | \$117,844 | \$106,059 | \$88,383 | \$58,922 |
| Multi Res | \$1,891,800 | \$1,702,620 | \$1,418,850 | \$945,900 |
| Commercial | \$1,560,168 | \$1,404,151 | \$1,170,126 | \$780,084 |
| Other | \$25,007 | \$22,507 | \$18,756 | \$12,504 |
| I3 | \$1,608,798 | \$1,447,918 | \$1,206,599 | \$804,399 |
| Reclaimed | \$1,000,000 | \$900,000 | \$750,000 | \$500,000 |
| Total Commodity Revenue | \$11,135,000 | \$10,021,500 | \$8,351,250 | \$5,567,500 |
| Capacity Revenue | \$6,391,000 | \$6,391,000 | \$6,391,000 | \$6,391,000 |
| Total Rate Revenue | \$17,526,000 | \$16,412,500 | \$14,742,250 | \$11,958,500 |
| Total Water Supply Costs | \$7,573,000 | \$6,815,700 | \$5,679,750 | \$3,786,500 |
| Avoided Cost of Water | | \$757,300 | \$1,893,250 | \$3,786,500 |
| Net Reduction in Revenue | | (\$356,200) | (\$890,500) | (\$1,781,000) |

To mitigate against the loss of revenue, a reduction in water use could result in a revenue shortfall for SCWD. To overcome such an impact to revenue, SCWD would impose a drought surcharge and allocate the funds from this drought surcharge to a Drought Stabilization. Imposing a drought surcharge will allow SCWD to recover all of its extraordinary drought-related expenses and lost revenues to meet fixed costs. This method of cost recovery is straightforward to administer and will allow for more accurate prediction of the additional revenue that will be generated. As in the past, SCWD would establish a rate stabilization fund to assist SCWD in managing the shortfall.

5.7. Reduction Measuring Mechanism

Should it become necessary for SCWD to initiate the actions mandated by the Water Shortage Contingency Plan, SCWD will continuously compare actual demand and supply with projected demand to determine if adjustments are required. SCWD utilizes a sophisticated Telemetry and Control System (SCADA) that monitors SCWD

consumption in real time. This along with increasing the frequency of its meter reading will allow SCWD to monitor the effectiveness of its reduction program.

MWDOC will provide each member agency with water use monthly reports that will compare each member agency's current cumulative retail usage to their allocation baseline. MWDOC will also provide quarterly reports on its cumulative retail usage versus its allocation baseline.

Reduction Monitoring Mechanisms are listed in Table 5-9.

Table 5-9: Water Use Monitoring Mechanisms

| Mechanisms for Determining Actual Reductions | Type of Data Expected |
|---|---|
| Telemetry and Control System | Real Time District Consumption |
| MWDOC Water Use Monthly Reports | Comparison of cumulative retail usage to allocation baseline. |
| Name of Mechanism | |

6. Recycled Water

6.1. Agency Coordination

There are a number of water agencies in south Orange County that provide potable water service as well as wastewater collection and treatment. These agencies depend on imported water supplies for the majority of their potable water supplies due to misfortune of geography in that very little groundwater supplies are available. These agencies have been in the forefront of recycled water development to diversify water supplies. Over the years most of these agencies have given up individual wastewater treatment facilities and joined the regional South Orange County Wastewater Authority (SOCWA).

Table 6-1: Participating Agencies

| Participating Agencies | Participated |
|------------------------|---------------|
| Water Agencies | MNWD, SCWD |
| Wastewater Agencies | SOCWA |
| Groundwater Agencies | SJBA |

6.2. Wastewater Description and Disposal

SCWD delivers approximately 7 MG of potable water to customers' homes and businesses daily and removes approximately 4 MG of wastewater per day for treatment. SCWD has 140 miles of sewer main lines ranging from 6 inches to 24 inches in diameter, 14 sewer lift stations, 3 miles of force mains and more than 3,400 manholes within the system.

Collected wastewater is pumped to one of two treatment plants owned and operated by SOCWA. Wastewater undergoes pre-treatment, primary treatment and secondary treatment, before it safely enters the ocean miles offshore through a pipeline (outfall.) The treated wastewater (effluent) meets the quality standards of the Federal Clean Water Act for offshore discharge.

Table 6-2 summarizes the past, current, and projected wastewater volumes collected and treated, and the quantity of wastewater treated to recycled water standards for treatment plants within SOCWA's service area. Table 6-3 summarizes the disposal method, and treatment level of discharge volumes.

Table 6-2: Wastewater Collection and Treatment (AFY)

| Type of Wastewater | Fiscal Year Ending | | | | | | |
|--|--------------------|--------|--------|--------|--------|--------|----------|
| | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| Wastewater Collected & Treated in Service Area | 29,223 | 28,149 | 30,460 | 31,536 | 32,249 | 32,249 | 32,249 |
| Volume that Meets Recycled Water Standards | 8,678 | 8,887 | 9,598 | 9,940 | 10,301 | 10,301 | 10,301 |

Table 6-3: Disposal of Wastewater (Non-Recycled) (AFY)

| Method of Disposal | Treatment Level | Fiscal Year Ending | | | | | |
|--------------------|-----------------|--------------------|--------|--------|--------|--------|----------|
| | | 2010 | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| Ocean Outfall | Secondary | 19,262 | 20,862 | 21,596 | 21,948 | 21,948 | 21,948 |

6.3. Current Recycled Water Uses

In 1984, SCWD constructed an Advanced Wastewater Treatment (AWT) facility that is located at the Coastal Treatment Plant (CTP) with a capacity of 2.6 MGD. The AWT is owned by SCWD and operated by SOCWA. The recycled water distribution system consists of three (3) pumping stations with a total pumping capacity of 5,200 gallons per minute, three (3) reservoirs with a storage capacity of 4.7 million gallons, and 18 miles of distribution pipelines.

The plant receives influent from the CTP which provides secondary treatment before discharging the treated effluent through ocean outfall. SCWD annually produces approximately 960 AFY of recycled water, of which approximately 130 AFY is distributed to MNWD throughout the year. MNWD during low demand months back feeds recycled water from another source into a shared 3.3 MG reservoir to replace the previous month's usage to end up with a zero balance owed at the end of the fiscal year and any unreimbursed demand for the year is billed to MNWD by SCWD at that time.

Table 6-4 below illustrates the current uses for recycled water in SCWD. The usage is limited to landscape irrigation with a disinfected tertiary treatment level.

Table 6-4: Current Recycled Water Uses (AFY)

| User Type | Treatment Level | Fiscal Year Ending |
|----------------------|----------------------|--------------------|
| | | 2010 |
| Agriculture | | |
| Landscape | Disinfected Tertiary | 790 |
| Wildlife Habitat | | |
| Wetlands | | |
| Industrial | | |
| Groundwater Recharge | | |
| Total | | 790 |

6.4. Potential Recycled Water Uses

Aliso Creek Water Harvesting Project

SCWD has conducted a preliminary investigation of a project to intercept and treat a portion of the urban runoff in lower Aliso Creek to supplement the recycled water system. This would improve the quality of the recycled water supply to make it more attractive for irrigation users. Treatment would include filtration and reverse osmosis facilities near the Coastal Treatment Plant. The plant would produce up to 0.5 MGD of low TDS water. This project could provide up to 300 AFY of additional recycled water. SCWD is investigating other sources of recycled water to meet the ultimate projection of 1,400 AFY.

Tables 6-5 and 6-6 present projected recycled water use within SCWD's service area through 2035. Recycled water use will increase approximately 77%, as stated above, through the 25-year period, with landscape irrigation and dual plumbed commercial as its future uses.

Table 6-5: Projected Future Use of Recycled Water in Service Area (AFY)

| User Type | Fiscal Year Ending | | | | | |
|---------------------------------|--------------------|-------|-------|-------|-------|----------|
| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| Projected Use of Recycled Water | 790 | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |

Table 6-6: Projected Recycled Water Uses (AFY)

| User Type | Fiscal Year Ending | | | | | |
|------------------------|----------------------|--------------|--------------|--------------|--------------|--------------|
| | Treatment Level | 2015 | 2020 | 2025 | 2030 | 2035-opt |
| Agriculture | | | | | | |
| Landscape | Disinfected Tertiary | 1,100 | 1,180 | 1,270 | 1,360 | 1,360 |
| Wildlife Habitat | | | | | | |
| Toilet/Urinal Flushing | Disinfected Tertiary | | 20 | 30 | 40 | 40 |
| Wetlands | | | | | | |
| Industrial | | | | | | |
| Groundwater Recharge | | | | | | |
| Total | | 1,100 | 1,200 | 1,300 | 1,400 | 1,400 |

Table 6-7 compares the recycled water use projections from SCWD's 2005 UWMP with actual 2010 recycled water use.

Table 6-7: Recycled Water Uses – 2005 Projections compared with 2010 Actual (AFY)

| User Type | 2005 Projection for 2010 | 2010 Actual Use |
|----------------------|--------------------------|-----------------|
| Agriculture | | |
| Landscape | 1,000 | 790 |
| Wildlife Habitat | | |
| Wetlands | | |
| Industrial | | |
| Groundwater Recharge | | |
| Total | 1,000 | 790 |

6.4.1. Direct Non-Potable Reuse

SCWD currently uses water from their recycled water system for direct non-potable reuse such as landscape irrigation.

6.4.2. Indirect Potable Reuse

SCWD does not have the potential for indirect potable reuse within their service area.

6.5. Optimization Plan

In Orange County, the majority of recycled water is used for irrigating golf courses, parks, schools, business and communal landscaping. However, future recycled water use

can increase by requiring dual piping in new developments, retrofitting existing landscaped areas and constructing recycled water pumping stations and transmission mains to reach areas far from the treatment plants. Gains in implementing some of these projects have been made throughout the county; however, the additional costs, large energy requirements, and facilities make such projects very expensive to pursue.

To optimize the use of recycled water, cost/benefit analyses must be conducted for each potential project. Once again, this brings about the discussion on technical and economic feasibility of a recycled water project requiring a relative comparison to alternative water supply options.

SCWD will conduct future cost/benefit analyses for recycled water projects, and seek creative solutions and a balance to recycled water use, in coordination with MWDOC, Metropolitan and other cooperative agencies. These include solutions for funding, regulatory requirements, institutional arrangements and public acceptance.

7. Future Water Supply Projects and Programs

7.1. Water Management Tools

Resource optimization such as desalination to minimize the needs for imported water is led by the regional agencies in collaboration with local agencies.

With the advancement in Advanced Wastewater Treatment Plants and improvements in the water recycling plant process, along with efforts in reducing water waste, SCWD can meet projected demands with existing facilities and distribution system.

7.2. Transfer or Exchange Opportunities

Metropolitan currently has a tiered unbundled rate structure. Tier 2 of this rate structure increases the cost of supply to a member agency in order to provide a price signal that encourages development of alternative supply sources. One alternative source of supply may be a transfer or exchange of water with a different agency.

The CALFED Bay-Delta Program (CALFED) has helped to develop an effective market for water transactions in the Bay-Delta region. This market is demonstrated by the water purchases made by the Environmental Water Account and Metropolitan in recent years. MWDOC and its member agencies plan to take advantage of selected transfer or exchange opportunities in the future. These opportunities can help ensure supply reliability in dry years and avoid the higher Tier 2 cost of supply from Metropolitan. The continued development of a market for water transactions under CALFED will only increase the likelihood of MWDOC participation in this market when appropriate opportunities arise.

MWDOC will continue to help its member agencies in developing these opportunities and ensure their successes. In fulfilling this role, MWDOC will look to help its member agencies navigate the operational and administrative issues of wheeling water through Metropolitan water distribution system.

SCWD relies on the efforts of Metropolitan as well as MWDOC to pursue transfer or exchange opportunities. At this time, SCWD is not currently involved in any transfer or exchange opportunities.

7.3. Planned Water Supply Projects and Programs

Capistrano Beach GRF Expansion

SCWD constructed a 1 MGD Groundwater Recovery Facility (GRF) that came on-line in FY 07-08 in Capistrano Beach, adjacent to San Juan Creek. The plant was built initially for 1,300 AFY but production is limited to about 800 AFY by water rights restrictions and the capacity of a single well. SCWD plans to expand the GRF along with a new well. The San Juan Basin Authority (SJBA) is performing a study to evaluate potential new well sites. A new well will allow SCWD to draw on the Groundwater basin from a second location, resulting in a decrease in pump rate from the existing well and a reduced pumping cone of influence drawdown. SCWD will need to construct a 2nd well in order to extract the permitted limit of 1,300 AFY and construction of additional wells will be required to reach the proposed goal of 3,200 AFY. Treating in excess of the 1,300 AFY will require expansion of the GRF Treatment facilities.

Upper Chiquita Reservoir

Santa Margarita Water District is constructing the Upper Chiquita Reservoir with a capacity of 244 MG (750 AF), near Oso Parkway and the 241 Toll Road. The reservoir can largely mitigate a short-term outage of the AMP and partially mitigate a similar Diemer outage. SCWD requested to allocate 13.2 MG (49 AF) of the reservoir's capacity for additional operational use. The reservoir began construction in June 2009 and is anticipated to be completed in early 2011.

Aliso Creek Water Harvesting Project

SCWD has conducted a preliminary investigation of a project to intercept and treat a portion of the urban runoff in lower Aliso Creek to supplement the recycled water system. This would improve the quality of the recycled water supply to make it more attractive for irrigation users. Treatment would include filtration and reverse osmosis facilities near the Coastal Treatment Plant. The plant would produce up to 0.5 MGD of low TDS water.

Table 7-1: Specific Planned Water Supply Projects and Programs

| Project Name | Projected Start Date | Projected Completion Date | Normal-Year Supply to Agency (AF) | Single-Dry Year Yield (AF) | Multiple-Dry-Year 1 Yield (AF) | Multiple-Dry-Year 2 Yield (AF) | Multiple-Dry-Year 3 Yield (AF) |
|----------------------------------|----------------------|---------------------------|-----------------------------------|----------------------------|--------------------------------|--------------------------------|--------------------------------|
| Capistrano Beach GRF Expansion | 2012 | 2014 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| Upper Chiquita Reservoir Project | 2009 | 2011 | 49 | 49 | 49 | 49 | 49 |

7.4. Desalination Opportunities

Until recently, seawater desalination has been considered uneconomical to be included in the water supply mix. However, recent breakthroughs in membrane technology and plant siting strategies have helped reduce desalination costs, warranting consideration among alternative resource options. However, the implementation of large-scale seawater desalination plants faces considerable challenges. These challenges include high capital and operation costs for power and membrane replacement, availability of funding measures and grants, addressing environmental issues and addressing the requirements of permitting organizations, such as the Coastal Commission. These issues require additional research and investigation.

MWDOC has been in the process of studying the feasibility of ocean desalination on behalf of its member agencies. MWDOC is reviewing and assessing treatment technologies, pretreatment alternatives, and brine disposal issues, and identifying and evaluating resource issues such as permitting, and the regulatory approvals (including CEQA) associated with the delivery of desalinated seawater to regional and local distribution system.

MWDOC is also assisting its member agencies in joint development of legislative strategies to seek funding in the form of grant and/or loans, and to inform decision-makers of the role of seawater desalination in the region's future water supplies. Observing the strategies and outcomes of other agency programs (such as that in Tampa Bay, Florida) to gain insights into seawater desalination implementation and cost issues is also being undertaken.

In Orange County, there are three proposed ocean desalination projects that could serve MWDOC, including two that specifically may benefit SCWD. These are the Huntington Beach Seawater Desalination Project, the South Orange Coastal Desalination Project, and the Camp Pendleton Seawater Desalination Project.

Table 7-2: Opportunities for Desalinated Water

| Sources of Water | Check if Yes |
|----------------------|--------------|
| Ocean Water | X |
| Brackish Ocean Water | X |
| Brackish Groundwater | X |

7.4.1. Groundwater

SCWD currently owns and operates a Groundwater Recovery Facility with a capacity of 1 MGD that removes iron and manganese using Reverse Osmosis. SCWD plans to expand the GRF along with a new well to allow SCWD to draw on the Groundwater basin from a second location, as well as the construction of additional wells to reach the 2,000 AFY goal.

7.4.2. Ocean Water

Huntington Beach Seawater Desalination Project – Poseidon Resources LLC (Poseidon), a private company, has proposed development of the Huntington Beach Seawater Desalination Project to be located adjacent to the AES Generation Power Plant in the City of Huntington Beach along Pacific Coast Highway and Newland Street. The proposed project would produce up to 50 MGD (56,000 AFY) of drinking water and will distribute water to coastal and south Orange County to provide approximately 8% of Orange County’s water supply needs. The project supplies would be distributed to participating agencies through a combination of (1) direct deliveries through facilities including the East Orange County Feeder #2 (EOCF #2), the City of Huntington Beach’s distribution system, and the West Orange County Water Board Feeder #2 (WOCWBF #2), and (2) water supply exchanges with agencies with no direct connection to facilities associated with the Project.

Poseidon had received non-binding Letters of Intent (LOI) from the Municipal Water District of Orange County and 17 retail water agencies to purchase a total of approximately 72 MGD (88,000 AFY) of Project supplies. On July 28, 2009, SCWD signed a non-binding LOI for 2.7 MGD (3,000 AFY) of Project supplies.

The Project has received specific approvals from the Huntington Beach City Council, including the Coastal Development Permit, Tentative Parcel Map, Subsequent Environmental Impact Report (EIR) and Conditional Use Permit, which collectively provided for the long-term operation of the desalination facility.

In addition to final agreements with the participating agencies, the Project still needs approvals from the State Lands Commission and the California Coastal Commission

before Poseidon can commence construction of the desalination facility in Huntington Beach. A public hearing on the Project before the State Lands Commission is expected as early as this October. If project receives all required permits by 2011, it could be producing drinking water for Orange County by as soon as 2013.

South Orange Coastal Desalination Project – MWDOC is proposing a desalination project in joint with Laguna Beach County Water District, Moulton Niguel Water District, City of San Clemente, City of San Juan Capistrano, South Coast Water District, and Metropolitan. The project is to be located adjacent to the San Juan Creek in Dana Point just east of the transition road from PCH to the I-5. The project will provide 15 MGD (16,000 AFY) of drinking water and will provide up to 30% of its potable water supply to the participating agencies. Currently, SCWD's preliminary project water supply is 3 MGD (3,360 AFY).

Phase 1 consists of drilling 4 test borings and installing monitoring wells. Phase 2 consists of drilling, constructing and pumping a test slant well. Phase 3 consists of constructing a Pilot Test Facility to collect and assess water quality. Phases 1 and 2 have been completed and Phase 3 commenced in June 2010 and will last 18 months.

If pumping results are favorable after testing, a full-scale project description and EIR will be developed. If EIR is adopted and necessary permits are approved, project could be operational by 2016.

Camp Pendleton Seawater Desalination Project– San Diego County Water Authority (SDCWA) is proposing a desalination project in joint with Metropolitan to be located at Camp Pendleton Marine Corps Base adjacent to the Santa Margarita River. The initial project would be a 50 or 100 MGD plant with expansions in 50 MGD increments up to a max of 150 MGD making this the largest proposed desalination plant in the US.

The project is currently in the study feasibility stage and is conducting geological surveys to study the effect on ocean life and examining routes to bring desalination to SDCWA's delivery system. MWDOC and south Orange County agencies are maintaining a potential interest in the project, but at this time is only doing some limited fact finding and monitoring of the project.

8. UWMP Adoption Process

8.1. Overview

Recognizing that close coordination among other relevant public agencies is the key to the success of its UWMP, SCWD worked closely with other entities such as MWDOC to develop and update this planning document. SCWD also encouraged public involvement through a holding of a public hearing to learn and ask questions about their water supply.

This section provides the information required in Article 3 of the Water Code related to adoption and implementation of the UWMP. Table 8-1 summarizes external coordination and outreach activities carried out by SCWD and their corresponding dates. The UWMP checklist to confirm compliance with the Water Code is provided in Appendix A.

Table 8-1: External Coordination and Outreach

| External Coordination and Outreach | Date | Reference |
|--|-----------------------------|------------|
| Encouraged public involvement (Public Hearing) | June 2, 2011 & June 9, 2011 | Appendix F |
| Notified city or county within supplier's service area that water supplier is preparing an updated UWMP (at least 60 days prior to public hearing) | March 23, 2011 | Appendix E |
| Held public hearing | June 23, 2011 | Appendix F |
| Adopted UWMP | June 23, 2011 | Appendix G |
| Submitted UWMP to DWR (no later than 30 days after adoption) | July 23, 2011 | |
| Submitted UWMP to the California State Library and city or county within the supplier's service area (no later than 30 days after adoption) | July 23, 2011 | |
| Made UWMP available for public review (no later than 30 days after filing with DWR) | August 22, 2011 | |

This UWMP was adopted by SCWD Board of Directors on June 23, 2011. A copy of the adopted resolution is provided in Appendix G.

A change from the 2004 legislative session to the 2009 legislative session required SCWD to notify any city or county within its service area at least 60 days prior to the public hearing. SCWD sent a Letter of Notification to the County of Orange, the City of

Laguna Beach, and the City of Dana Point on March 23, 2011 that it is in the process of preparing an updated UWMP (Appendix E).

8.2. Public Participation

SCWD encouraged community and public interest involvement in the plan update through public hearings and inspection of the draft document. Public hearing notifications were distributed through utility bills and published in local newspapers. A copy of the published Notice of Public Hearing is included in Appendix F. The hearing provided an opportunity for all residents and employees in the service area to learn and ask questions about their water supply in addition to SCWD's plans for providing a reliable, safe, high-quality water supply. Copies of the draft plan were made available for public inspection at the City Clerk's and Utilities Department offices. Public hearings are scheduled to be held on June 6, 2011 for plan discussion and June 23, 2011 for plan review and adoption.

8.3. Agency Coordination

All of the SCWD's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. SCWD is dependent on imported water from Metropolitan through MWDOC, its regional wholesaler. SCWD is also dependent on groundwater from the San Juan Groundwater Basin managed by SJBA. In addition to imported water and groundwater supplies, SCWD incorporates into its water supply recycled water treated by SOCWA. The SCWD involved these aforementioned water providers in the development of its 2010 UWMP at various levels of contribution as summarized in Table 8-2.

Table 8-2: Coordination with Appropriate Agencies

| | Participated in Plan Development | Commented on Draft | Attended Public Meetings | Contacted for Assistance | Sent Copy of Draft Plan | Sent Notice of Intention to Adopt | Not Involved/No Information |
|----------------------------|--|-----------------------|--------------------------------|--------------------------------|----------------------------------|--|-----------------------------------|
| MWDOC | X | | | X | X | X | |
| SOCWA | X | | | X | X | X | |
| SJBA | X | X | X | X | X | X | |
| City of Dana Point | X | | | X | X | X | |
| City of Laguna Beach | X | | | X | X | X | |
| County of Orange | X | | | X | X | X | |
| City of San Clemente | X | | | X | X | X | |

As a member agency of MWDOC, MWDOC provided assistance to SCWD's 2010 UWMP development by providing much of the data and analysis such as, population projections, demand projections, and SBx7-7 modeling. SCWD's UWMP was developed in collaboration with MWDOC's 2010 RUWMP to ensure consistency between the two documents as well as Metropolitan's 2010 RUWMP and 2010 Integrated Water Resources Plan.

As a groundwater producer who relies on supplies from the San Juan Basin, SCWD also coordinated the preparation of this 2010 UWMP with SJBA.

8.4. UWMP Submittal

8.4.1. Review of Implementation of 2005 UWMP

As required by California Water Code, SCWD summarizes the implementation of the Water Conservation and Water Recycling Programs to date, and compares the implementation to those as planned in its 2005 UWMP.

Comparison of 2005 Planned Water Conservation Programs with 2010 Actual Programs

As a signatory to the MOU regarding urban water use efficiency, SCWD's commitment to implement BMP-based water use efficiency program continues today. For SCWD's specific achievements in the area of conservation, please see Section 4 of this Plan.

Comparison of 2005 Projected Recycled Water Use with 2010 Actual Use

Current recycled water projections for SCWD in 2010 are about 21% less than previously forecasted for 2010 in the 2005 UWMP, as illustrated in Table 6-7.

8.4.2. Filing of 2010 UWMP

The Board of Directors reviewed the Final Draft Plan on June 23, 2011. The five-member Board of Directors approved the 2010 UWMP on June 23, 2011. See Appendix G for the resolution approving the Plan.

By July 23, 2011, SCWD's Adopted 2010 UWMP was filed with DWR, California State Library, County of Orange, and cities within its service area.

Appendices

- A. Urban Water Management Plan Checklist
- B. San Juan Basin Authority Groundwater Management and Facility Plan
- C. Calculation of Dry Year Demands
- D. Resolution No. 23-85/86; Ordinance No. 206
- E. 60 Day Notification Letters
- F. Public Hearing Notice
- G. Copy of Plan Adoption

Appendix A

Urban Water Management Plan Checklist

Urban Water Management Plan checklist, organized by subject

| No. | UWMP requirement ^a | Calif. Water Code reference | Additional clarification | UWMP location |
|-------------------------|--|--------------------------------|--------------------------|---------------|
| PLAN PREPARATION | | | | |
| 4 | Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable. | 10620(d)(2) | | Section 8.3 |
| 6 | Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Any city or county receiving the notice may be consulted and provide comments. | 10621(b) | | Appendix E |
| 7 | Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq. | 10621(c) | | Section 8.4 |
| 54 | Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan. | 10635(b) | | Section 8.4 |
| 55 | Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. | 10642 | | Section 8.2 |
| 56 | Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area. | 10642 | | Appendix F |
| 57 | Provide supporting documentation that the plan has been adopted as prepared or modified. | 10642 | | Appendix G |
| 58 | Provide supporting documentation as to how the water supplier plans to implement its plan. | 10643 | | Section 8.4 |

| No. | UWMP requirement a | Calif. Water Code reference | Additional clarification | UWMP location |
|---------------------------|---|-----------------------------|---|--------------------------------|
| 59 | Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to the California State Library and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. This also includes amendments or changes. | 10644(a) | | Section 8.4 |
| 60 | Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours | 10645 | | Section 8.4 |
| SYSTEM DESCRIPTION | | | | |
| 8 | Describe the water supplier service area. | 10631(a) | | Section 1.3.1 |
| 9 | Describe the climate and other demographic factors of the service area of the supplier | 10631(a) | | Section 2.2.1 |
| 10 | Indicate the current population of the service area | 10631(a) | Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M | Section 2.2.2 |
| 11 | Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections. | 10631(a) | 2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents. | Section 2.2.2 |
| 12 | Describe other demographic factors affecting the supplier's water management planning. | 10631(a) | | Section 2.2.3 |
| SYSTEM DEMANDS | | | | |
| 1 | Provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data. | 10608.20(e) | | Section 2.4.4 Section 2.4.5 |
| 2 | Wholesalers: Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. Retailers: Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009. | 10608.36 10608.26(a) | Retailers and wholesalers have slightly different requirements | Appendix F Section 2.4.6 |

| No. | UWMP requirement ^a | Calif. Water Code reference | Additional clarification | UWMP location |
|------------------------|--|-----------------------------|--|----------------|
| 3 | Report progress in meeting urban water use targets using the standardized form. | 10608.40 | | Not applicable |
| 25 | Quantify past, current, and projected water use, identifying the uses among water use sectors, for the following: (A) single-family residential, (B) multifamily, (C) commercial, (D) industrial, (E) institutional and governmental, (F) landscape, (G) sales to other agencies, (H) saline water intrusion barriers, groundwater recharge, conjunctive use, and (I) agriculture. | 10631(e)(1) | Consider 'past' to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years. | Section 2.3 |
| 33 | Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types | 10631(k) | Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030. | Section 2.5 |
| 34 | Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier. | 10631.1(a) | | Section 2.5.2 |
| SYSTEM SUPPLIES | | | | |
| 13 | Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030. | 10631(b) | The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided. | Section 3.1 |
| 14 | Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column. | 10631(b) | Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other. | Section 3.3 |
| 15 | Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization. | 10631(b)(1) | | Appendix B |
| 16 | Describe the groundwater basin. | 10631(b)(2) | | Section 3.3 |
| 17 | Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree. | 10631(b)(2) | | Not applicable |

| No. | UWMP requirement ^a | Calif. Water Code reference | Additional clarification | UWMP location |
|-----|--|--------------------------------|---|---------------|
| 18 | Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate "not applicable" in the UWMP location column. | 10631(b)(2) | | Section 3.3.4 |
| 19 | For groundwater basins that are not adjudicated, provide information as to whether DWR has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. If the basin is adjudicated, indicate "not applicable" in the UWMP location column. | 10631(b)(2) | | Section 3.3 |
| 20 | Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years | 10631(b)(3) | | Section 3.3.6 |
| 21 | Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped. | 10631(b)(4) | Provide projections for 2015, 2020, 2025, and 2030. | Section 3.3.6 |
| 24 | Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis. | 10631(d) | | Section 7.2 |
| 30 | Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project. | 10631(h) | | Section 7.3 |
| 31 | Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater. | 10631(i) | | Section 7.4 |
| 44 | Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area. | 10633 | | Section 6.1 |
| 45 | Describe the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal. | 10633(a) | | Section 6.2 |

| No. | UWMP requirement ^a | Calif. Water Code reference | Additional clarification | UWMP location |
|---|--|-----------------------------|--------------------------|---------------|
| 46 | Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project. | 10633(b) | | Section 6.2 |
| 47 | Describe the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use. | 10633(c) | | Section 6.3 |
| 48 | Describe and quantify the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses. | 10633(d) | | Section 6.4 |
| 49 | The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected. | 10633(e) | | Section 6.4 |
| 50 | Describe the actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year. | 10633(f) | | Section 6.5 |
| 51 | Provide a plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use. | 10633(g) | | Section 6.5 |
| WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING ^b | | | | |
| 5 | Describe water management tools and options to maximize resources and minimize the need to import water from other regions. | 10620(f) | | Section 3 |
| 22 | Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years. | 10631(c)(1) | | Section 3.5.1 |
| 23 | For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable. | 10631(c)(2) | | Section 3.5.2 |
| 35 | Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50-percent water supply reduction, and an outline of specific water supply conditions at each stage | 10632(a) | | Section 5.2 |

| No. | UWMP requirement ^a | Calif. Water Code reference | Additional clarification | UWMP location |
|-----|---|--------------------------------|---|-----------------|
| 36 | Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply. | 10632(b) | | Section 5.3 |
| 37 | Identify actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster. | 10632(c) | | Section 5.4 |
| 38 | Identify additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning. | 10632(d) | | Section 5.5 |
| 39 | Specify consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply. | 10632(e) | | Section 5.5 |
| 40 | Indicated penalties or charges for excessive use, where applicable. | 10632(f) | | Section 5.5 |
| 41 | Provide an analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments. | 10632(g) | | Section 5.6 |
| 42 | Provide a draft water shortage contingency resolution or ordinance. | 10632(h) | | Appendix D |
| 43 | Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis. | 10632(i) | | Section 5.7 |
| 52 | Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability | 10634 | Four years 2010, 2015, 2020, 2025, and 2030 | Section 3.5.2.1 |

| No. | UWMP requirement ^a | Calif. Water Code reference | Additional clarification | UWMP location |
|-----------------------------------|--|-----------------------------|---|---|
| 53 | Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier. | 10635(a) | | Section 3.5.3 Section 3.5.4 Section 3.5.5 |
| DEMAND MANAGEMENT MEASURES | | | | |
| 26 | Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided. | 10631(f)(1) | Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules. | Section 4 |
| 27 | Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP. | 10631(f)(3) | | Section 4 |
| 28 | Provide an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the ability to further reduce demand. | 10631(f)(4) | | Section 4 |
| 29 | Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work. | 10631(g) | See 10631(g) for additional wording. | Not applicable |
| 32 | Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU. | 10631(j) | Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29. | Not Applicable |

a The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.

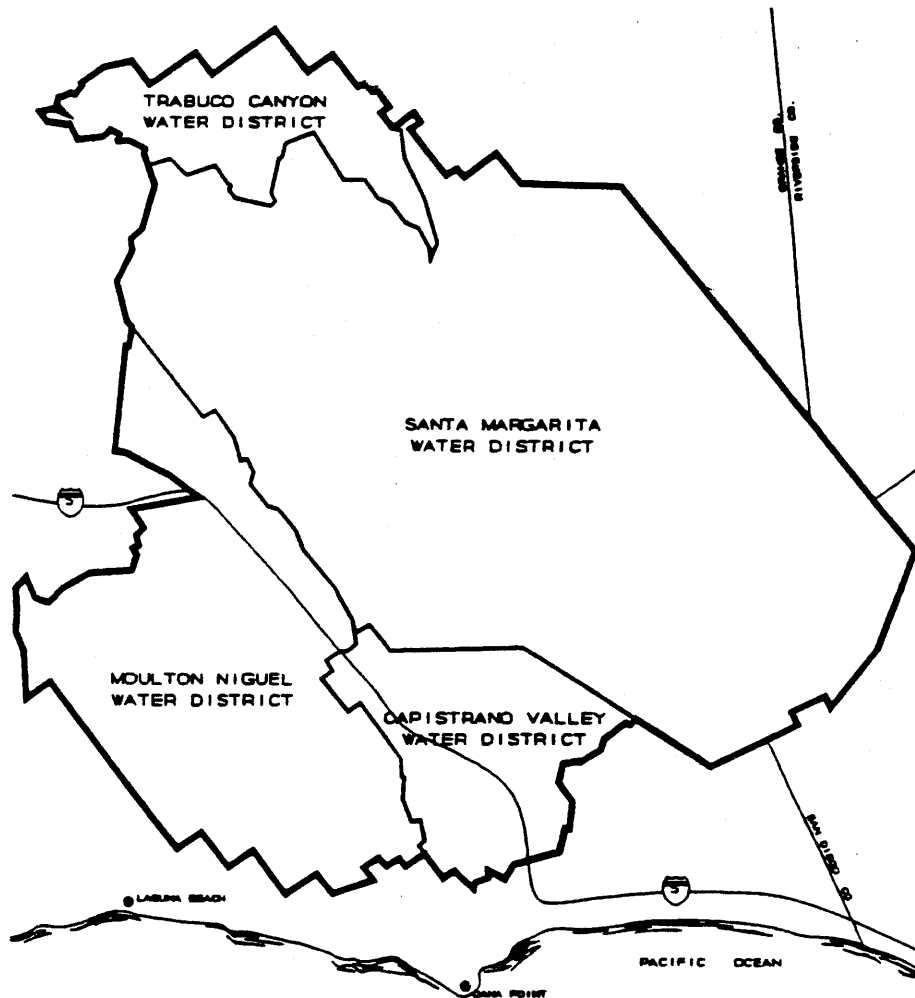
b The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review

Appendix B

San Juan Basin Authority Groundwater Management and Facility Plan

SAN JUAN BASIN GROUNDWATER MANAGEMENT AND FACILITY PLAN

95-03



May 1994

Prepared For The
San Juan Basin Authority
And
The Metropolitan Water District
Of Southern California

By:

NBS
LOWRY

ENGINEERS & PLANNERS

**SAN JUAN BASIN
GROUNDWATER MANAGEMENT
AND FACILITY PLAN**

**Prepared for the:
SAN JUAN BASIN AUTHORITY
and
THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA**

**Prepared by:
NBS/Lowry Engineers and Planners
Irvine, California**

May 1994

I87-011.029

EXECUTIVE SUMMARY

The San Juan Basin Groundwater Management and Facility Plan is the first step being taken to implement the recently adopted mission of the San Juan Basin Authority, which is:

"to develop and maintain a reliable, good quality and economical local water supply for the residents in the San Juan Basin by maximizing use of local ground and surface water, the San Juan Creek and its tributaries, with due consideration for the preservation and enhancement of the environment, including, but not limited to, the natural resources, fish and wildlife, infrastructure improvements, and the cultural heritage of the area."

The California Department of Water Resources in the five-year update of the California Water Plan (Bulletin 106-93) released the following information:

- California's population is projected to increase to 49 million by 2020, driving water demand up about 3.8 million acre-feet to 10.5 million acre-feet, even with 1 million acre-feet of urban water conservation.
- Increased demand, combined with reduced supplies from the Colorado River, results in shortages in the South Coast region for 2020 of 0.4 million acre-feet for average years and 1.0 million acre-feet in drought years, even with the planned Domenigoni Reservoir. Shortages could be larger if the Sacramento-San Joaquin Delta problems are not solved. Statewide water shortages could amount to over 7 million acre-feet in drought years.

These projections highlight the need for developing local water supplies to the maximum extent possible. New water supplies that can be developed locally will lessen the burden on the long import systems of the Metropolitan Water District. Managed groundwater basins used conjunctively with imported water can provide emergency storage and seasonal storage capability. With the rapidly developing criteria for the uses of reclaimed water, the managed groundwater basins can also be used to store reclaimed water as well as storm runoff under controlled conditions.

This plan proposes the construction of the following facilities.

Phase I will consist of a 4 mgd desalter, five extraction wells with piping, and a pump station and product water pipeline to CVWD's water delivery system. Phase II will expand the desalter to 8 mgd and a total of 12 extraction wells, and the product water pipeline extension and pump station to the South County Pipeline. The total estimated cost of all facilities (Phases I and II) is \$33,812,000. Phase I facilities are estimated at \$15,160,000.

The Phase II facilities will have the maximum treated project water yield of approximately 7,000 to 8,000 acre-feet per year for a three-year drought or emergency period. At other times, the project will produce 3,500 to 4,000 acre-feet per year.

The Phase I facilities will produce a potable water supply of 1,800 acre-feet annually from sustained yield. Phase I will control groundwater gradients to minimize subsurface outflow to the ocean, provide seasonal storage capacity and provide 3,600 acre-feet per year emergency potable supplies from basin storage.

A rigorous economic, financial and benefit-to-cost analysis was performed for the Phase I project. Benefit-to-cost ratios based on present worth of 0.96 to 1.18 can be demonstrated depending on MWDSC water cost scenarios and the evaluation of drought/storage aspects of the project. The higher benefit-to-cost ratios (1.08 to 1.18) justify a water supply project providing 1,800 acre-feet per year. The drought/storage aspects of the project are more difficult to evaluate with benefit-to-cost ratios of 0.96 to 1.10. Non-quantifiable benefits must also be considered. These include the available storage created by accessing basin storage, the improved reliability due to less dependence on imported water, local water resource control and the local impacts of the dynamic MWDSC water pricing and availability.

RECOMMENDATIONS

The following specific recommendations are proposed:

- 1) Continue with the water rights appropriation with the goal to appropriate all unappropriated waters of the San Juan Creek for the project.
- 2) Develop and implement a cooperative strategy with MWDOC to request MWDSC funding assistance by applying for participation in their Groundwater Recovery, Seasonal Storage and Local Projects programs. Explore the possibility of MWDSC participation in capital funding participation.
- 3) Initiate the CEQA process for the entire project.
- 4) File application for financial aid from State of California in the form of a low-interest loan.
- 5) Initiate the process to obtain a 25 percent grant from USBR.
- 6) Develop and implement a local funding plan for the portion of the project not funded by State loan or USBR grant.
- 7) Acquire rights-of-way or easements for the necessary facilities which include: desalting facility, well sites and pipelines.
- 8) Initiate design of Phase I facilities and develop a construction phasing plan.

- 9) Develop and initiate a monitoring and data reporting program that includes: measurement of groundwater levels, metering of pumped water, and groundwater quality sampling programs.
- 10) Develop a basin management program that includes the evaluation of the monitoring program and integration into the mathematical model to develop a projected annual water balance for the basin each year.
- 11) Initiate studies to explore the use and integration of reclaimed water into the basin. In particular, explore the use of recharged reclaimed water to increase sustained yield and recharged reclaimed water near the coast to aid in the control of water quality in the Lower San Juan Basin.

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CHAPTER 1

INTRODUCTION

PROJECT PURPOSE

The purpose of this project is to develop a management strategy for groundwaters of the San Juan Basin of Southern Orange County, Figure 1-1. This report presents analyses that provide the basis for operational studies to maximize the use of the basin for potable water supplies. Facilities envisioned include a desalting plant to treat poor to marginal quality groundwater in the lower portion of the basin, new wells to pump groundwaters, recharge facilities for recharging imported water, and pipelines and other ancillary equipment. These facilities would allow the groundwaters of the San Juan Basin to be used as a storage element in the local and regional water supply systems and particularly provide a supplemental supply during periods of drought or emergency.

This project was authorized and funded by the San Juan Basin Authority (SJBA) and the Metropolitan Water District of Southern California (MWDSC). Member agencies of the San Juan Basin Authority are: Capistrano Valley Water District (CVWD), Moulton Niguel Water District (MNWD), Santa Margarita Water District (SMWD) and Trabuco Canyon Water District (TCWD).

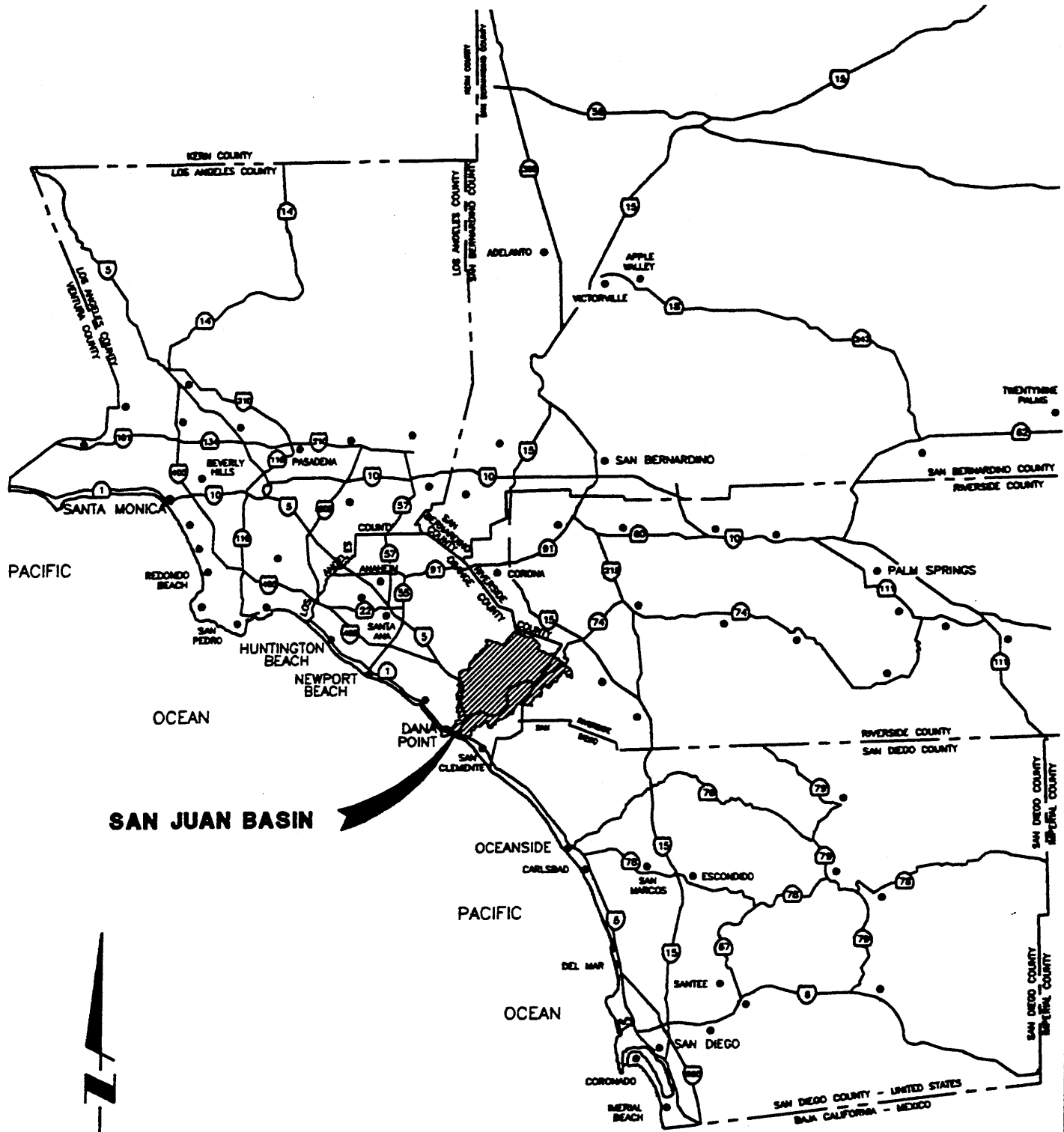
OBJECTIVES

The objective of this study was to mathematically model surface and groundwaters of the San Juan Basin with sufficient accuracy so that model simulations could be conducted to develop a best management strategy. Such a plan would include maximization of groundwater withdrawals of in situ waters, use of the basin for storage of imported MWDSC water, and withdrawals of stored water during times of drought or emergency. Groundwater withdrawals and use of the basin for storage would include the lower portion of the basin near the coast where sediments are the thickest. The groundwater storage is greatest in this part of the basin; however, the water quality is poor to marginal with a TDS in the 2,000 mg/l range. It is envisioned that water quality problems would be dealt with by using a desalting facility to be constructed in the area.

Such studies will provide the basis for conceptual design, the development of cost estimates and a financing plan. Specific objectives are to determine the flow capacity of a desalting plant and estimate the quality of the supply stream, size and location of extraction wells, as well as size and location of potential artificial recharge sites.

PROJECT SCOPE

This project primarily relies on previously published reports and sparse available data on historical hydrologic conditions for the San Juan Basin and its vicinity. However, extensive



SAN JUAN BASIN

San Juan Basin Authority

**LOCATION OF
THE SAN JUAN BASIN**

**NBS
LOWRY**

SCALE: AS SHOWN FIGURE 1-1

efforts were undertaken to determine the location of existing and historic wells in the basin. Both historical records, local accounts and field reconnaissance were used to locate wells. Field work was also conducted to locate potential new facilities such as a desalting plant, wells, and recharge facilities.

RELATED INVESTIGATIONS

One of the primary sources of data for this study was the 1972 Department of Water Resources (DWR) Bulletin No. 104-7, "Planned Utilization of Water Resources in the San Juan Creek Basin Area." This report provided sufficient information on geology and hydrologic factors to attempt more detailed studies conducted herein. Because original studies on geology, climate and hydrologic parameters were not conducted as part of the investigation reported herein, the reader is referred to the DWR report for information of this nature.

In 1977, the Jack G. Raub Company published a report prepared for the Mission Viejo Company on "Feasibility Investigation, Restoration of Lower San Juan Creek Basin by Removal of High Salinity Groundwater for Beneficial Use." This report was useful in that it attempted to better reconcile various estimates of the depth of bedrock in the lower portion of the basin, drawing data from a number of sources. One of the main thrusts of the Raub report was to estimate groundwater storage in the lower basin area.

More recently in 1987, Camp Dresser & McKee (CDM) performed studies on the San Juan Basin for the Project Authority to develop management plans to better use the local groundwaters. Their work is reported on in several progress reports and summary reports. The main thrust of their work was to conduct sampling of surface and groundwaters and develop a mathematical model of water quality. The main result from this work is that it was determined that the poor to marginal quality groundwaters in the lower basin area did not originate from point or non-point surface sources. Apparently, poor quality groundwaters are the result of geochemical processes related to dissolution of in situ rock.

CHAPTER 2

GEOHYDROLOGY

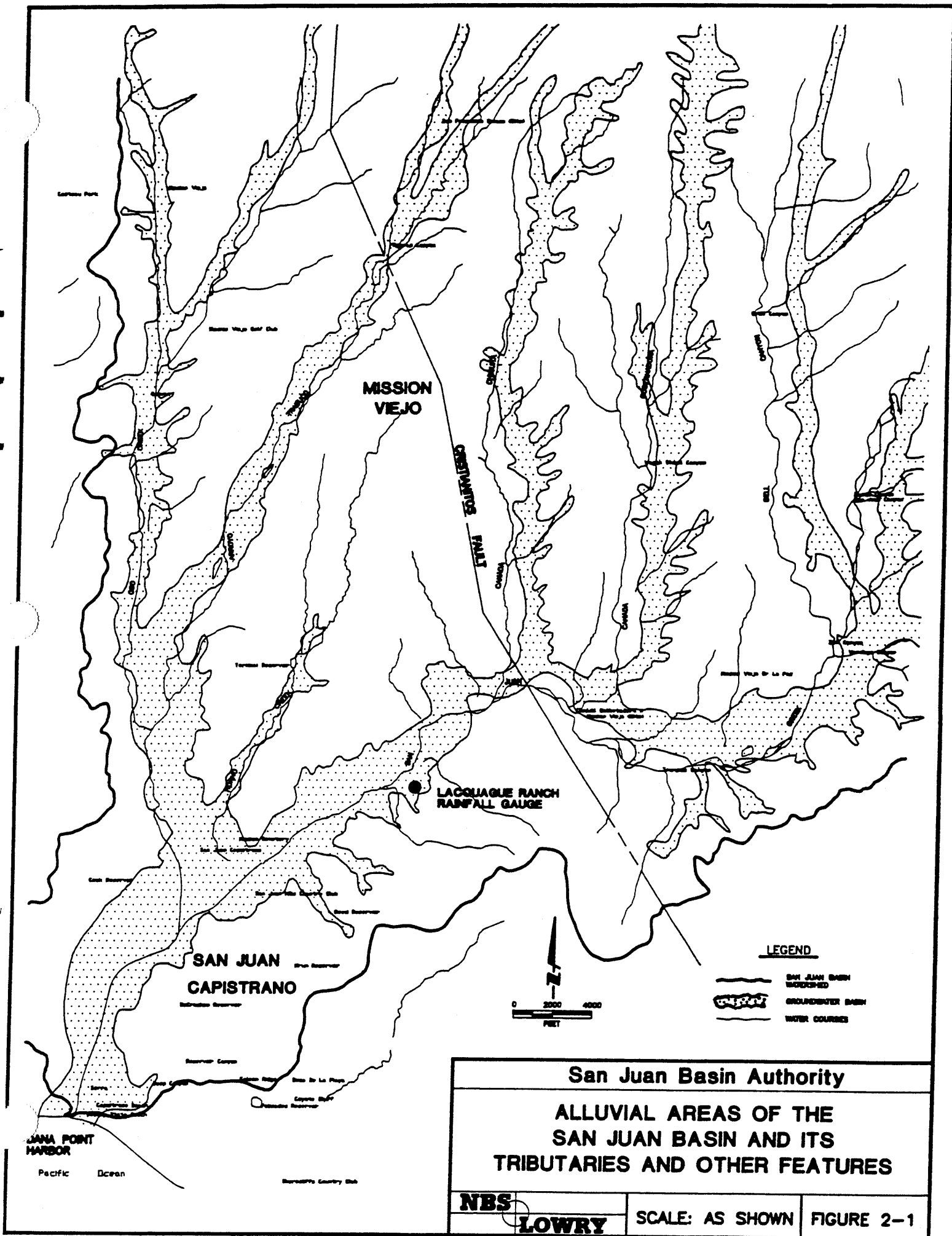
THE GROUNDWATER REGIME

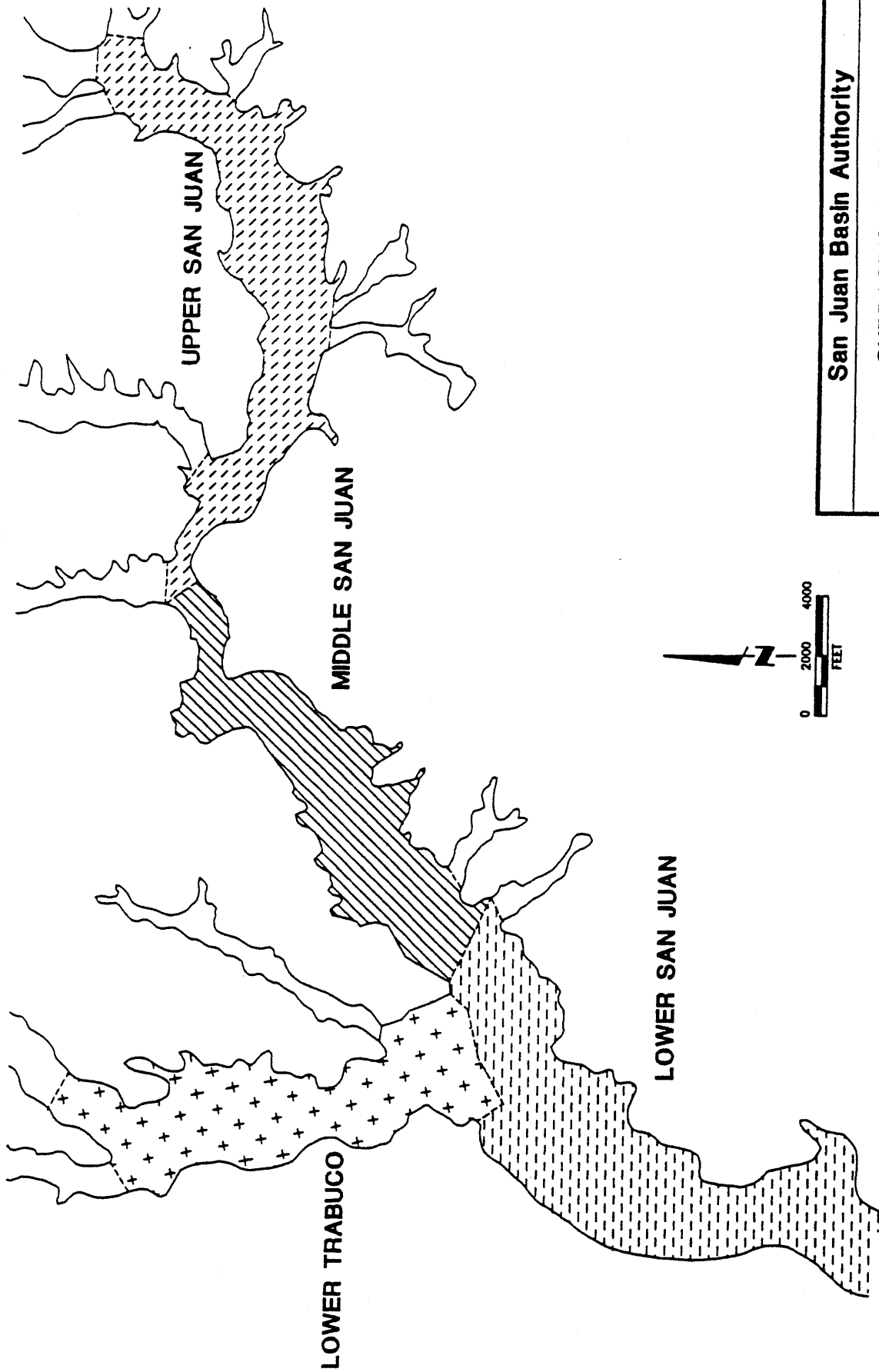
Groundwater exists in generally narrow, shallow alluvial valley fill that has been deposited in the San Juan Canyon area and its tributaries: Trabuco, Oso and numerous other smaller canyons (Figure 2-1). Groundwater in these alluvial fill areas is unconfined. According to the various reports reviewed and discussed previously, the alluvial fill material is underlain by nonwater-bearing Tertiary siltstones, claystones, and sandstones. Alluvial fill ranges from reported depths of 200 feet at the coast to essentially zero at the end of the small alluvial fingers tributary to the main canyons. The widest part of the alluvial fill is about one mile at the confluence of Trabuco and San Juan Creeks. Typical widths in the main canyons are less than one-half mile.

For purposes of the study reported herein, only the main groundwater-bearing alluvial fill was considered: San Juan Canyon from the coast to a point about 11 river miles upstream of the coast and Lower Trabuco Canyon about 2.5 river miles upstream from the confluence with San Juan Creek to the intersection of Oso and Trabuco Canyons (Figure 2-1). The many upstream and tributary fingers of generally shallow alluvium were considered as input elements to the main basins, but were not included in the mathematical model area of the basin.

The major structural feature in the area influencing groundwater movement is the Cristianitos Fault (Figure 2-1), which generally traverses the area in a north-south direction and crosses the San Juan Canyon at a narrows about 3.5 river miles upstream from the confluence of San Juan and Trabuco Creeks. Both previously published reports and the mathematical modeling studies conducted herein indicate that this fault and narrows effectively separate the groundwater alluvium into an upper and lower area. Consequently, a basin designation scheme used by CDM will be employed in this report and the basin areas will be designated as depicted in Figure 2-2. The three basins downstream from the Cristianitos Fault are referred to as the "lower basins."

Based upon a review of previous studies and inspection of the area, it is apparent the groundwaters generally flow downslope in the canyons toward the Pacific Ocean. The origin of groundwater in the main subbasins adopted for study is subsurface inflow from tributary alluvial fingers, Figure 2-1, and recharge from streambed, rainfall and (to a lesser extent) applied water percolation. Outflow or discharge from groundwater is subsurface outflow to the ocean, consumption by abundant phreatophytes (that may be seen along most water courses), and extraction by wells. Along many reaches of the San Juan Creek, high groundwater tables intersect the creek bottoms causing seepage to the creek which may subsequently percolate back to the groundwater or flow out to the ocean as streamflow. Estimated mean annual individual components of the hydrologic cycle range from less than a thousand to several thousand acre-feet. Combined groundwater storage capacity in the Upper, Middle and Lower San Juan, and Lower Trabuco subbasins is estimated to be somewhat over 63,000 acre-feet.





San Juan Basin Authority

SUBBASINS OF THE
SAN JUAN BASIN

NBS

LOWRY

SCALE: AS SHOWN

FIGURE 2-2

GROUNDWATER STORAGE CAPACITY

Groundwater storage capacity for an unconfined aquifer is estimated from the volume of sediments multiplied by the specific yield which is defined as the ratio of water that can be drained by gravity to the total volume of sediments (including mineral soil and pore space). Typical values of specific yield range from 3 percent for clays to 25 percent for medium sands. Values used for specific yield herein were based upon general guidelines published by the U.S. Geological Survey and the various previous reports cited.

The most difficult aspect in estimating groundwater storage capacity in this study was determining the base of the aquifer. The most helpful information for the lower basin was provided by the Raub report. This information was combined with information from the DWR report and other sources to estimate sediment depths. In general, the DWR report was regarded as the most definitive and efforts were made to reconcile estimates developed here with the DWR report.

It should be recognized that the actual effective depth may be more. It is possible that the assumed underlying indurated sedimentary rock may be weathered and fractured, contributing groundwater storage. Detailed geological studies would be required to determine if this is the case.

Table 2-1 presents estimates of groundwater storage capacity for each of the main subbasins. It should be recognized that these estimates assume storage is available between the ground surface and bedrock surface. Obviously, this could not be achieved since it would entail waterlogging building foundations. From a practical standpoint, only the basin sediments 10 to 15 feet below the surface to bedrock could be used for storage.

TABLE 2-1

GROUNDWATER STORAGE CAPACITY OF THE SAN JUAN BASIN

| Subbasin | Storage Capacity (ac-ft) |
|-----------------|-----------------------------|
| Middle San Juan | 9,640 |
| Lower Trabuco | 11,940 |
| Lower San Juan | <u>20,020</u> |
| Lower Basins | 41,600 |
| Upper San Juan | <u>21,620</u> |
| Total | 63,220 |

SELECTION OF STUDY PERIOD

One of the objectives of the hydrologic modeling phase is to determine the sustained (or safe) yield of the San Juan Basin under current conditions. Secondly, it is essential to calibrate the mathematical model over a representative period of record. Both needs can be met by carefully selecting a historical study period. The criteria to accomplish this is to select a recent period where, hopefully, data on historical conditions will be adequate, select a period long enough so meaningful results can be achieved, and select a period that reasonably represents long-term conditions. This latter criteria implies that the mean natural conditions (say precipitation) during the study period selected should equal the long-term mean and that there should be a number of above-normal water supply years and a number of below-normal water supply years.

An accumulated departure from the mean precipitation diagrams is a tool to aid in the selection of a study period. Figure 2-3 was prepared using historical annual precipitation at the Lacouague Ranch gage (Figure 2-1). This figure indicates that from the mid-1940's there has been generally below-normal precipitation to the mid-1970's, from the mid-1970's to the mid-1980's generally above-normal precipitation, and from the mid-1980's to present there have been drought conditions.

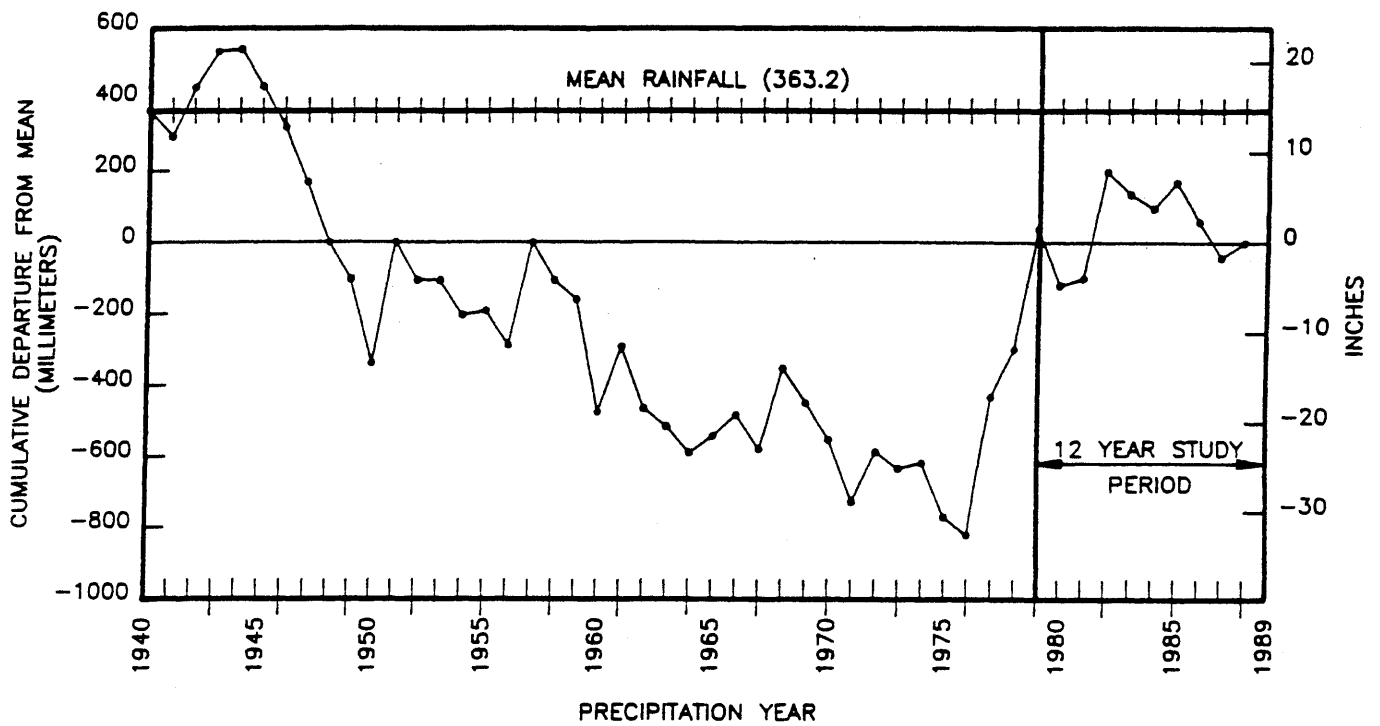
A 12-year study period, 1979-1990, was selected as the study period. This period represents long-term conditions of natural water supply to the San Juan Basin and meets the other criteria for selection of a study period, with perhaps the exception that some important historical data such as pumpage is not available. However, this data is not readily available for any historical period.

ESTIMATED BASIN INPUTS AND OUTPUTS UNDER HISTORICAL CONDITIONS

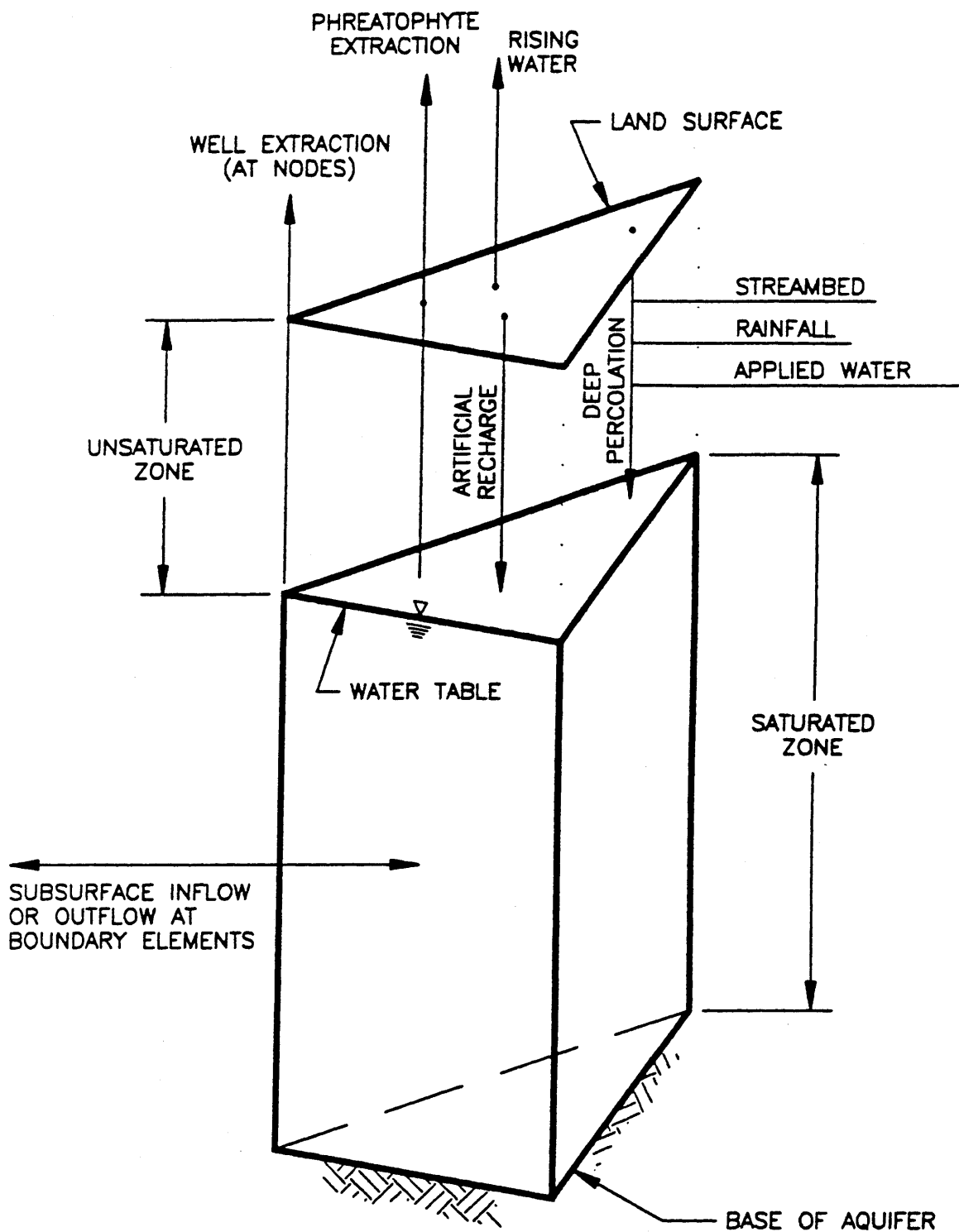
One of the main objectives of this study was to develop a mathematical model of the San Juan Basin groundwater system; consequently, the basin inputs and outputs are evaluated on the basis of the saturated zone as a lumped system. In fact, because of the incompleteness of historic data on inputs and outputs, they were determined in the mathematical modeling calibration and verification phase of this study.

Figure 2-4 depicts the components of recharge (inputs) and discharge (outputs) for the saturated zone of the basin. Recharge consists of streambed percolation in the mainstem streams: San Juan and Trabuco Creeks, rainfall infiltration and deep percolation to the water table, deep percolation of applied water from landscape and agricultural irrigation, and subsurface inflow from tributary alluvial riverbed areas. Figure 2-4 also depicts an artificial recharge component which has not historically occurred. This component is included because artificial recharge is one of the management tools envisioned for the future. Discharges (outputs) from the basin consist of well extractions, extraction by phreatophytes (which are capable of obtaining water from near the water table), and subsurface outflow to the Pacific Ocean. An additional output consists of so-called "rising water" which is a historic term that means seepage to a stream channel when the water table intersects the stream channel.

SAN JUAN BASIN CUMULATIVE DEPARTURE FROM MEAN PRECIPITATION, LOCOUAGUE RANCH GAUGE



| | | |
|--|-------|-----------------|
| San Juan Basin Authority | | |
| SAN JUAN BASIN CUMULATIVE DEPARTURE FROM MEAN PRECIPITATION, LACOUAGUE RANCH GAUGE | | |
| NBS | LOWRY | SCALE: AS SHOWN |
| | | FIGURE 2-3 |



| | | |
|---|-----------------|------------|
| San Juan Basin Authority | | |
| SCHEMATIC DEPICTION OF ELEMENT INPUTS AND OUTPUTS OF THE SAN JUAN BASIN | | |
| NBS LOWRY | SCALE: AS SHOWN | FIGURE 2-4 |

TABLE 2-2
PARAMETERS USED TO ESTIMATE
COMPONENTS OF THE HYDROLOGIC CYCLE
FOR THE SAN JUAN BASIN

| Parameter | Value |
|--|-------------|
| Residential Landscape Applied Water Duty | 2.5 ft./yr. |
| Agricultural Applied Water Duty | 3.0 ft/yr. |
| Precipitation Percolation Factor | 0.17 |
| Pan Evapotranspiration (ET) Factor | 0.70 |
| Applied Water Leaching Fraction | 0.15 |
| Hydraulic Conductivity (K) | |
| Ocean Outflow | 1.5 ft./hr. |
| Subsurface Inflow | 5.2 ft./hr |

In the case of the San Juan Creek, this condition has historically occurred from time to time in several river reaches in the basin.

Estimates of input and output for natural hydrologic components were based upon a rainfall index station and estimated pan evaporation (Appendix A). Percolation of rainfall was estimated by using annual historical rainfall for the Lacouague Ranch gage and multiplying by a constant infiltration factor, Table 2-2. Streambed percolation was estimated by first estimating stream inflow at the basin boundaries using a lumped stream model that used synthetic rainfall versus streamflow relationships developed from gaged watersheds in the vicinity of the San Juan Basin. This model will be subsequently described. To develop baseline model calibration data, it was assumed that stream inflow was primarily from precipitation with little or no contribution from urban applied water runoff originating from imported potable water. Streambed percolation was estimated from the following function:

$$Q = 0.30 Q_s, \text{ if } 0 \leq Q_s \leq 17,404$$

$$Q = 20.9 Q_s^{0.556}, \text{ if } Q_s > 17,404$$

where Q_s is streamflow at the basin boundary in cubic feet/hour.

This function was determined by calibration and information presented in the DWR report. Subsurface inflow was estimated by using the lumped streamflow model referred to above and estimating the water table elevation adjacent to the main groundwater basin. Using simulated water surface elevations in the basin to compute water table gradients, Darcy's Law was used to estimate subsurface inflow as follows:

$$Q = A \cdot K \cdot \text{grad } H$$

where H is the water surface elevation, A is the cross-sectional area, and K is the hydraulic conductivity (Table 2-2), sometimes called permeability.

Man-influenced recharge of applied water was estimated by an applied water duty for agricultural irrigation and irrigation of parks, lawns, and other open irrigated space in developed areas. Aerial photos were used to determine land use acreage, and typical duty factors were used with a leaching factor to determine percolation of applied water (Table 2-2). Land use was considered static during the study period.

Outflow (discharge) consists of three natural components: subsurface outflow, phreatophyte extraction, and rising water; and one man-influenced component: well extraction. Subsurface outflow was estimated by Darcy's Law (above) using simulated water table elevations in the basin adjacent to the coast and sea level to estimate gradients. Phreatophyte extraction was estimated by a modified Hargraves approach

$$Q = A \cdot f \cdot E$$

where A is the area of phreatophytes estimated from aerial photos and field reconnaissance, E is pan evaporation, and f is an evapotranspiration (ET) factor (Table 2-2). Rising water was determined in the mathematical modeling phase by keeping track of areas where simulated water tables intersected the ground surface.

Extractions by wells were difficult to estimate because historic records are incomplete or unavailable. Through field reconnaissance and anecdotal information, extraction wells were identified (pocket map). In consultation with SJBA member agencies, particularly the Capistrano Valley Water District, approximate annual pumping rates were determined for each active well. These estimates are shown in Table 2-3, and they are assumed to be constant for the 12-year study period. In the model, these pumpage values are considered maximum since in several areas of the basin wells are known to run dry during the summer months. A feature is included in the model to discontinue pumpage if the model simulates water tables that reach bedrock. Pumpage values were distributed to the closest nodes in the model.

Estimated inputs and outputs for the San Juan Basin for the period 1979-90 are tabulated in Table 2-4. Streambed percolation is based upon estimated surface inflows that are based upon precipitation runoff and do not include future inflows from landscape irrigation. Estimates in Table 2-4 are based upon historic land use in the tributary watersheds and it was assumed that contributions from landscape return flows were negligible.

The main components of the hydrologic cycle tabulated in Table 2-4 are subsurface inflow from the various alluvial tributaries along the northern flank of the main basin and groundwater pumpage in the main basin. Percolation of applied water from landscape irrigation in the main basin and extraction by phreatophytes were assumed constant for the 12-year study period although both varied by a small amount due to land use changes and annual climatic fluctuations. It will be noticed that rising water in the San Juan River averaged about 0.6 cfs, which is in the

TABLE 2-3
SAN JUAN BASIN
ESTIMATED GROUNDWATER PUMPAGE, 1979-90

| Basin Division | Average Annual Pumpage (ac-ft/yr) | Description |
|--------------------------------|--|--|
| Upper SJB | 600 | Oda Nursery |
| Upper SJB | 50 | Sand and Gravel |
| Upper SJB | 237 | Others, Including: Misc. Ag Sea Tree Nursery Tree of Life Nursery |
| Middle SJB | 200 | Others, Including: D&M Nursery Valley Crest Nursery Capistrano City of San Juan Capistrano |
| Middle SJB | 600 | CVWD #5 |
| Middle SJB | 450 | San Juan Hills Country Club |
| Lower SJB | 120 | Rancho Los Cerritos |
| Lower SJB | 150 | City of San Juan Capistrano/ Kinoshita |
| Lower SJB | 100 | Vermuellen |
| Lower SJB | 500 | CBCWD |
| Lower Trabuco | 600 | CVWD Rosenbaum #1 |
| Lower Trabuco | 600 | CVWD Rosenbaum #2 |
| Lower Trabuco | 250 | City of San Juan Capistrano/ Misc. Ag |
| Lower Trabuco | 87 | Other Misc. |
| Lower Trabuco | 800 | CVWD Marbella |
| Lower Trabuco | 300 | CVWD Hollywood #2A |
| Total Estimated Pumpage | 5,644 | |

Sources:

1. CDM, Groundwater Quality, TDS, Task 6, Sept. 19, 1987 and Task 7, Nov. 19, 1987
2. NBS/Lowry, Nichols Institute Report, Feb. 1990
3. Capistrano Valley Water District
4. Santa Margarita Water District
5. Individual pumpers

TABLE 2-4
ESTIMATED INPUTS AND OUTPUTS FOR THE
SATURATED ZONE OF THE SAN JUAN BASIN, 1979-90
(ACRE-FEET)

| Year | Percolation of Precipitation | Percolation of Applied Water | Streambed Percolation | Subsurface Inflow | Total Input | Rising Water | Pumpage | Phreatophyte Extraction | Ocean Outflow | Total Output | Net Input |
|------|---------------------------------|------------------------------------|--------------------------|----------------------|----------------|-----------------|---------|----------------------------|------------------|-----------------|--------------|
| 1979 | 1295. | 934. | 811. | 1038. | 4078. | 2239. | 5644. | 417. | 393. | 8693. | -4615. |
| 1980 | 1816. | 934. | 3407. | 1941. | 8098. | 1106. | 5644. | 417. | 977. | 8144. | -46. |
| 1981 | 459. | 934. | 318. | 2118. | 3829. | 488. | 5644. | 417. | 827. | 7376. | -3547. |
| 1982 | 942. | 934. | 632. | 2300. | 4808. | 300. | 5644. | 417. | 812. | 7173. | -2365. |
| 1983 | 1715. | 934. | 2579. | 2350. | 7578. | 507. | 5644. | 417. | 934. | 7502. | +76. |
| 1984 | 729. | 934. | 490. | 2401. | 4554. | 209. | 5644. | 417. | 832. | 7102. | -2548. |
| 1985 | 833. | 934. | 568. | 2451. | 4786. | 101. | 5644. | 417. | 801. | 6963. | -2177. |
| 1986 | 1047. | 934. | 729. | 2467. | 5177. | 63. | 5644. | 417. | 801. | 6925. | -1748. |
| 1987 | 645. | 934. | 399. | 2468. | 4446. | 16. | 5644. | 417. | 727. | 6804. | -2358. |
| 1988 | 597. | 934. | 361. | 2452. | 4344. | 0. | 5644. | 417. | 625. | 6686. | -2342. |
| 1989 | 983. | 934. | 634. | 2469. | 5020. | 0. | 5605. | 417. | 590. | 6612. | -1592. |
| 1990 | 1000. | 934. | 634. | 2494. | 5062. | 0. | 5404. | 417. | 557. | 6378. | -1316. |
| Mean | 1005. | 934. | 963. | 2246. | 5148. | 419. | 5621. | 417. | 740. | 7197. | -2049. |

range of historically observed flows. It will also be noticed that the basin was overdrafted by an average of about 2,000 acre-feet per year.

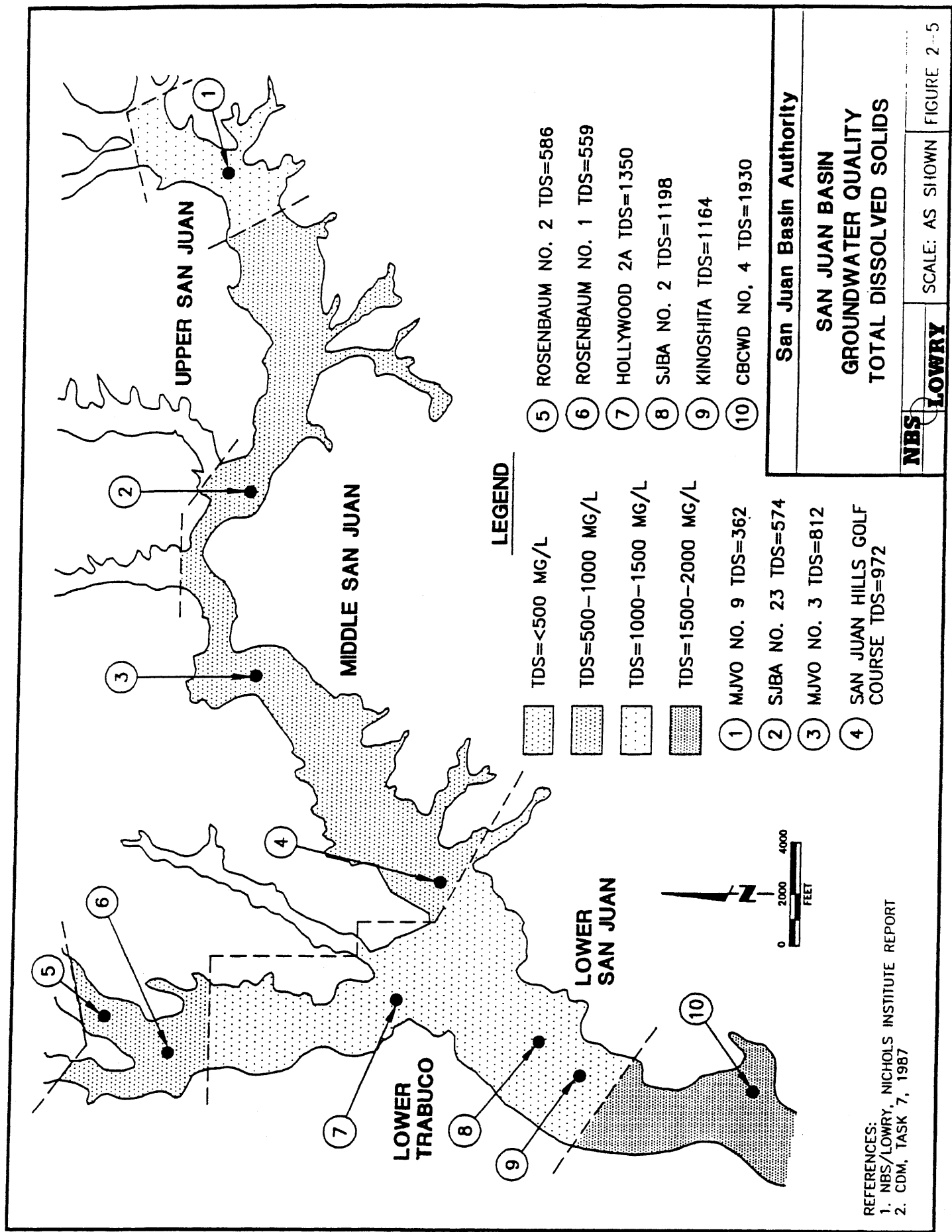
There is a moderate level of uncertainty associated with estimates of the various components of the hydrologic cycle for the San Juan Basin. As noted above, pumpage data is very uncertain. As will subsequently be described in the model calibration phase, every effort was made to refine estimated inflows and outflows to achieve as much accuracy as possible. Nevertheless, it is prudent to observe that the coefficient of variation of estimated sustained yield may be relatively high, perhaps as much as 50 percent. Consequently, assuming no rising water, no contribution from landscape return flows in the tributary watershed, and subsurface outflow to the sea is nil, there is a high level of confidence that sustained yield is between 2,200 and 6,600 acre-feet per year for historical cultural conditions.

WATER QUALITY

There apparently is little recent data on groundwater quality in the San Juan Basin. The most recent historical data available is summarized in the 1987 CDM report which contains some historical data prior to 1965 and groundwater quality data for 1987. According to this report groundwaters in the general San Juan Basin area had the following ranges in 1987:

| <u>Subbasin</u> | <u>mg/l</u> | | | |
|-----------------|-------------|-----------------------|-------------|-----------|
| | <u>TDS</u> | <u>SO₄</u> | <u>Iron</u> | <u>Mn</u> |
| Lower San Juan | 1500 - 2000 | 500 - 750 | > 2.0 | 0.5 - 1.5 |
| Lower Trabuco | 1000 - 1500 | 250 - 500 | 0 - 0.3 | 0 - 0.05 |
| Middle San Juan | 500 - 1000 | 250 - 500 | 0.3 - 2.0 | 0.5 - 1.5 |
| Upper San Juan | 0 - 500 | 0 - 250 | 0 - 0.3 | 0 - 0.05 |

General water quality is depicted in Figure 2-5.



CHAPTER 3

MATHEMATICAL MODELS

THEORETICAL BASIS

Flow Equation

A two-dimensional model of the unconfined aquifer system of the San Juan Basin was developed by assuming groundwater flows in a horizontal plane relative to the earth's surface. The vertical direction in the saturated zone is regarded as an integrated average wherein vertical velocity components are assumed to be zero.

The model is based upon the two-dimensional continuity equation and Darcy's Law as follows:

$$\frac{\partial}{\partial x} (K_x h \frac{\partial H}{\partial x}) + \frac{\partial}{\partial y} (K_y h \frac{\partial H}{\partial y}) = S_y \frac{\partial H}{\partial t} + Q_A$$

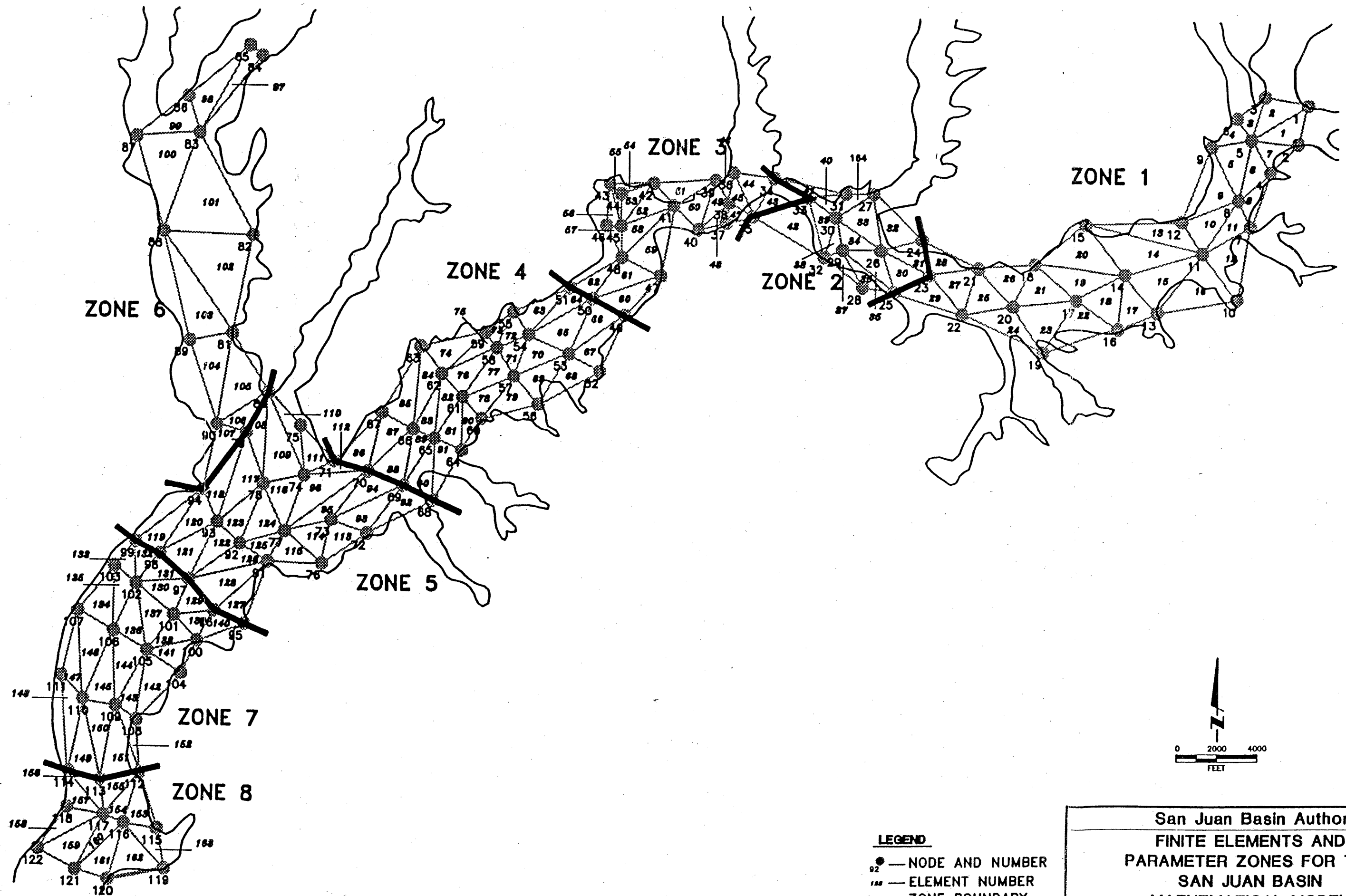
where x and y are coordinates in the horizontal plane tangent to the earth's surface, t is time, h is saturated thickness, H is elevation of water table, Q_A is a sink such as pumping, K_x and K_y are hydraulic conductivity in the x and y directions, respectively, and S_y is the specific yield. In this case it was assumed that K_x equals K_y .

The above equation assumes the basin materials are nondeformable. It is assumed that basin materials are locally homogeneous relative to specific yield. As discussed in the previous chapter, some inputs and outputs, i.e. sources or sinks, occur at the basin surface (an example being percolation of rainfall). It is assumed that these quantities flow through the intervening unsaturated zone in a short period of time and equal the Q_A term which applies to the saturated zone.

To solve the above flow equation, initial and boundary conditions are required. Initial conditions consist of known or assumed water table elevations at the beginning of a specified study period. Boundary conditions are of three types: no-flow along the flanks of the basin, specified water table elevations at the coast (i.e. zero elevation), and estimated subsurface inflow from tributary narrow fingers of alluvium. This latter boundary condition required a separate model linked to the basin model since this boundary condition is nonlinear.

Water Quality Model

The transport of dissolved salts in the saturated zone is governed by the complete mass transport equation which includes: advection, dispersion, mass accumulation, sorption, and geochemical dissolution. There is some speculation that high TDS in the lower portions of the San Juan Basin may be partly caused by dissolution of in situ rock. These processes proceed over long



LEGEND

- — NODE AND NUMBER
- ELEMENT NUMBER
- ZONE BOUNDARY

San Juan Basin Authority
FINITE ELEMENTS AND
PARAMETER ZONES FOR THE
SAN JUAN BASIN
MATHEMATICAL MODEL

NBS

LOWRY

SCALE: AS SHOWN

FIGURE 3-1

Figure 2-4 depicts the source-sink components for each element. Source-sink terms were estimated as previously described.

To specify basin hydraulic parameters, eight subregions were identified as shown in Figure 3-1. The model permits variable hydraulic conductivity and specific yield parameters which must be specified for each zone. Table 3-1 presents calibrated hydraulic conductivity, specific yield, and porosity for each zone.

Tributaries Model

To estimate subsurface inflow from the upper basins, a special numerical model based upon a lumped parameter cascaded cell approach was developed. Figure 3-2 depicts the structure of this model and the hydrologic components included in the model. The lumped parameter model is based on a water budget concept. The region is divided into several model reaches. Model reaches are cascaded by equating inflow to the subsequent reach with the computed outflow from the adjacent upstream reach. The surface water hydrologic balance for a reach i over a time step of δt is as follows:

$${}^iQ_I + {}^iR + {}^iQ_T + {}^iQ_D - {}^iET_S - {}^iQ_O - {}^iQ_P = 0$$

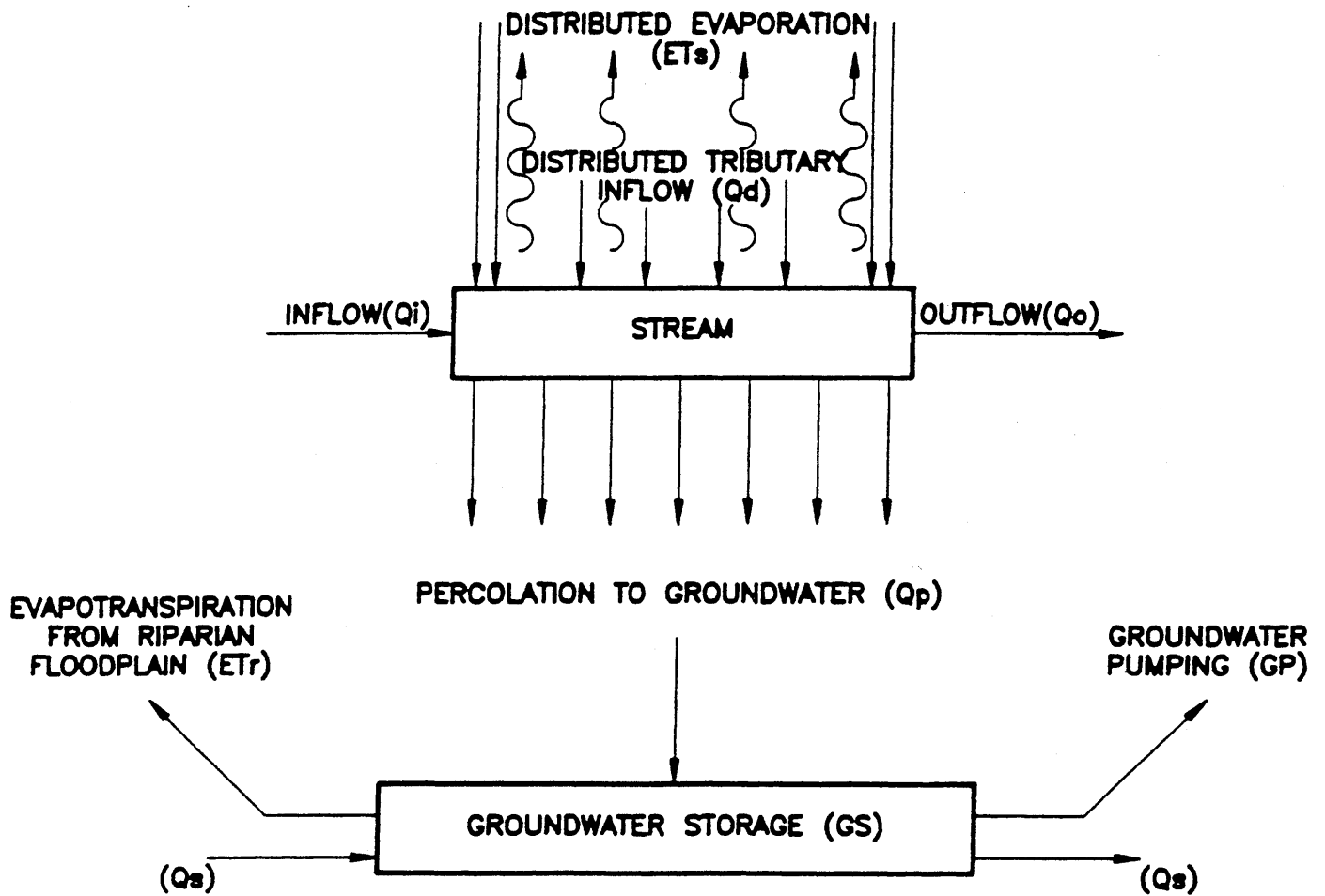
This equation is coupled with the groundwater hydrologic balance equation for each reach through the term iQ_P as follows:

$${}^iQ_S + {}^iQ_P - {}^iET_R - {}^iGP - {}^i\delta GS = 0$$

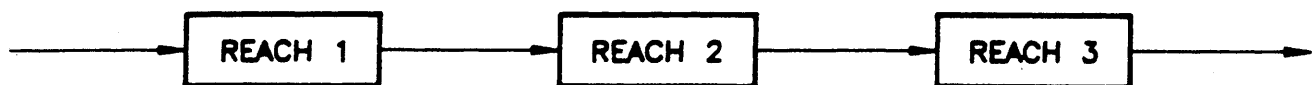
where iQ_I is the inflow, iR is the rainfall, iQ_T is the point tributary inflow, iQ_D is the distributed tributary inflow, iET_S is the distributed evaporation, iQ_O is the outflow, iQ_P is the percolation to groundwater, iQ_S is the subsurface linkage between reaches, iET_R is the evapotranspiration from the riparian floodplain, iGP is the groundwater pumping and ${}^i\delta GS$ is the change in groundwater storage for each i at time t . In general, these equations may require additional or less variables; i.e. the hydrologic balance equations are individualized for specific river basins.

Seepage or springs which may contribute to baseflow are included in the estimates of distributed tributary inflow, Q_D . Point tributary inflow Q_T from large ungaged tributary watersheds or from distributed tributary inflow was estimated from rainfall-runoff relationships developed for several gaged watersheds in the general region of the study basin. Based on isohyetal lines available and a consideration of topography, "foothill" and "mountain" area, rainfall-runoff relationships were developed relating the annual precipitation at a point close to or in the basin, the watershed area, and the annual runoff.

RAINFALL ON STREAM AND RIPARIAN FLOODPLAIN (R)



MODEL REACH VARIABLES



CASCADED MODEL REACHES

| San Juan Basin Authority | | |
|--------------------------|-------|-----------------|
| LUMPED PARAMETER MODEL | | |
| NBS | LOWRY | SCALE: AS SHOWN |
| | | FIGURE 3-2 |

TABLE 3-1
HYDRAULIC PARAMETERS USED FOR THE
CALIBRATED SAN JUAN BASIN MODEL

| Parameter Zone ^a | Hydraulic Conductivity (ft/day) | Specific Yield | Porosity |
|--------------------------------|---------------------------------------|-------------------|----------|
| 1 | 125 | 0.18 | 0.3 |
| 2 | 100 | 0.18 | 0.3 |
| 3 | 125 | 0.13 | 0.3 |
| 4 | 100 | 0.13 | 0.3 |
| 5 | 60 | 0.12 | 0.3 |
| 6 | 70 | 0.13 | 0.3 |
| 7 | 48 | 0.10 | 0.3 |
| 8 | 36 | 0.10 | 0.3 |

a) See Figure 3-1.

Evaporation from the stream, ET_s , and evapotranspiration from adjacent riparian areas, ET_R , are estimated from pan evaporation data as follows:

$$ET_s = f \cdot E \cdot L \cdot b$$

and

$$ET_R = f \cdot E \cdot L \cdot (b_o - b) \cdot C \cdot (GS/GS_o)$$

where f is the pan evaporation coefficient, assumed equal to 0.7 in our case, E is the pan evaporation, b is the average stream reach width, L is the reach length, b_o is the average reach total width of floodplain and riparian area, C is the percent of the reach's riparian area covered by vegetation, GS is the amount of groundwater in storage, and GS_o is the maximum groundwater storage capacity for a specific reach.

Average stream widths, b , and other flow characteristics are determined from regime equations as follows:

$$b = a_1 Q^k,$$

$$y = a_2 Q^l,$$

$$v = a_3 Q^m,$$

where

$$k + l + m = 1,$$

$$a_1 \cdot a_2 \cdot a_3 = 1,$$

where y is the stream average depth in feet, and v is the stream average flow velocity in feet per second. The flowrate Q in cubic feet per second is the sum of all the input discharges minus any diversions, such that

$$Q = Q_I + Q_T + Q_D$$

Some constraints on the application of these equations are imposed, based upon the observed regime and bed material of the stream under study. This was done by requiring that streamflow conditions could not exceed selected Froude numbers.

Groundwater storage is updated every time step according to

$${}_{n+1}^i GS = {}_n^i GS + {}_{n+1}^i \delta GS$$

as long as ${}_{n+1}^i GS \leq {}^i GS_0$. When the maximum groundwater storage is exceeded, percolation is assumed to be zero. Groundwater depth can easily be determined knowing the effective surface area of the groundwater reach.

This modeling approach was applied to alluvial areas tributary to the main San Juan Basin which are: Arroyo Trabuco, Canada Chiquita, Canada Gubernadora, Bell Canyon, and San Juan Creek. These tributary areas were considered to have significant surface and subsurface flows which are inputs to the main San Juan Basin. Other tributary areas such as Oso Creek, Horno Creek, and Verdugo Canyon were assumed to contribute negligible amounts of subsurface inflow; however, they would contribute measurable surface inflows. Surface inflows were estimated from rainfall-area relationships described above. All surface inflows were routed through the main basin to estimate streambed percolation as was previously described.

Water Quality Model

The water quality model is solved by integrated finite differences where it assumes that concentration is averaged over the vertical profile (i.e., sediments in the basin are thin relative to basin aerial dimensions). Because some nodes dry out due to excessive pumpage, a special algorithm was required to accommodate this problem. The model is integrated into the flow model described previously and uses the same basin grid system. The strength of the water quality model is its ability to estimate differences in groundwater quality resulting from alternative management strategies.

APPLICATION AND CALIBRATION OF MODEL

Water Quantity

To apply the model to the San Juan Basin, annual estimates of surface inputs and outputs to the saturated zone are made (i.e., excluding subsurface inflows and outflows). These estimates are then distributed to each month of the year by using average monthly distributions (Table 3-2). Rainfall distributions were used to estimate monthly streamflow and hence monthly streambed percolation and monthly percolation of rainfall. Monthly pan evaporation was used to estimate monthly percolation of applied water, monthly extraction by phreatophytes and monthly extraction from wells. The numerical solution time-step was one month. As was described previously, subsurface inflows and outflows were internally computed for this same time-step.

TABLE 3-2

**AVERAGE MONTHLY DISTRIBUTION OF
RAINFALL AND PAN EVAPORATION
FOR THE SAN JUAN BASIN**

| Month | Rainfall | Pan Evaporation |
|-------|----------|-----------------|
| Jan | 19.6 | 3.7 |
| Feb | 17.4 | 3.6 |
| Mar | 16.8 | 6.4 |
| Apr | 8.4 | 8.4 |
| May | 2.1 | 10.6 |
| Jun | 0.3 | 13.3 |
| Jul | 0.0 | 15.2 |
| Aug | 0.8 | 13.4 |
| Sep | 1.9 | 9.7 |
| Oct | 3.1 | 7.8 |
| Nov | 14.2 | 4.7 |
| Dec | 15.4 | 3.2 |

The model was applied to the 12-year study period, 1979-90, to attempt the best calibration possible in view of uncertain data on pumpage. In addition to the problem associated with lack of data on pumpage, there is very little data on groundwater levels. The usual way to calibrate a mathematical model is to simulate water levels over a historical period and compare simulated results with measured water levels. Unfortunately, water level data is available for only one

year, 1987, during the study period. Consequently, a great deal of reliance had to be placed upon judgement and the analysis presented in the 1972 DWR report on the San Juan Basin. Calibration consisted of first estimating inputs and outputs to the basin, assigning hydraulic conductivity and specific yield to each element of the model, and estimating geometric factors such as bedrock elevation. Simulated results were evaluated and parameters in the various components of the model were adjusted to perform additional simulations. After numerous such trials the model was considered calibrated.

Table 2-3 lists the annual calibrated inputs and outputs to the basin as was described previously. Figures 3-3, 3-4 and 3-5 show simulated water levels at various nodes throughout the basin. The dashed lines in these figures depict the one water level observation available for 1987.

During the calibration phase, it was apparent that the San Juan Basin acts as two separate basins, an upper basin and a lower basin. There is a definite geological constriction below the confluence of the San Juan Creek and Canada Chiquita which tends to constrict subsurface flow to the lower basins. The Cristianitos Fault crosses San Juan Creek in this area, and this fault in conjunction with a constriction of the canyon separates the San Juan Basin into the Upper San Juan Basin and the lower basins consisting of the Middle San Juan, Lower San Juan, and Lower Trabuco Basins.

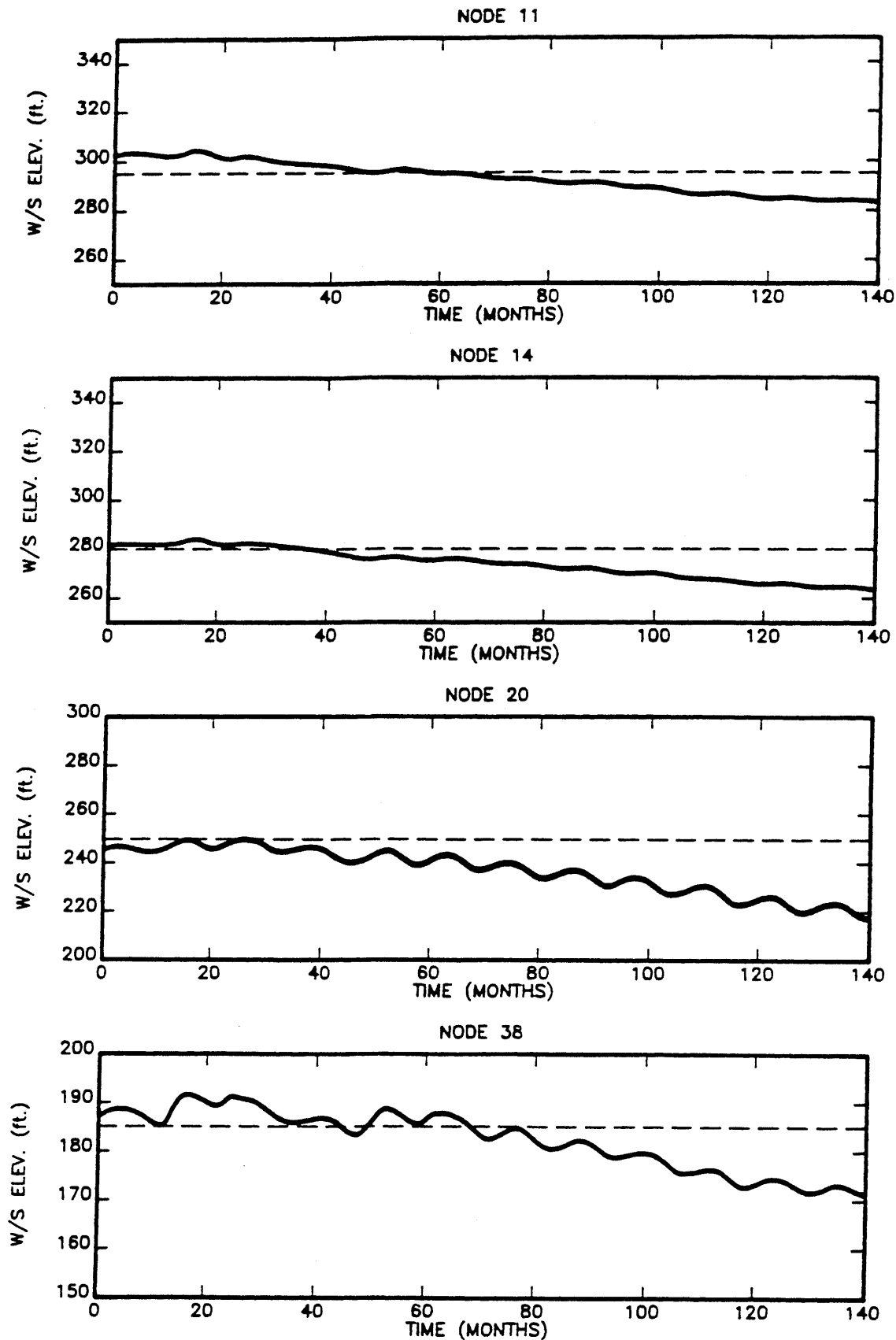
As was previously mentioned, the level of confidence for estimated inputs and outputs is moderate at best. However, the main power of mathematical modeling is not so much the ability to precisely predict a groundwater systems state at a particular time, but the ability to predict derivatives due to management changes. That is, what are the differences in behavior of the system between various management strategies? It is believed that the model has been sufficiently calibrated so that there is a good level of confidence in evaluating management scenarios.

Water Quality

Water quality simulations were carried out in parallel with the above described water quantity simulations. Tributary TDS input estimates were provided by Nolte and Associates and are shown in Table 3-3. As can be seen, current TDS values, which are assumed to represent historical conditions, are divided into storm and non-storm values. Non-storm TDS are assumed to represent baseflow and groundwater inflow which the tributaries model estimates. Stormflows are also estimated in the tributaries model. Precipitation percolation on the main basin was assumed to have a TDS of zero, and percolation of applied water and recharge was assumed to have a TDS of 800 mg/l. Sensitivity analysis of this last figure indicates there was little difference between a TDS of 600 and 800 mg/l on simulation results.

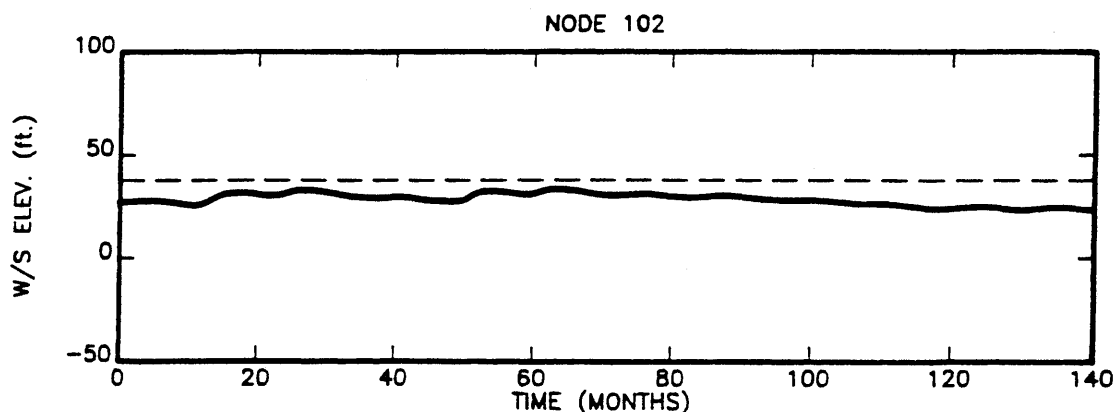
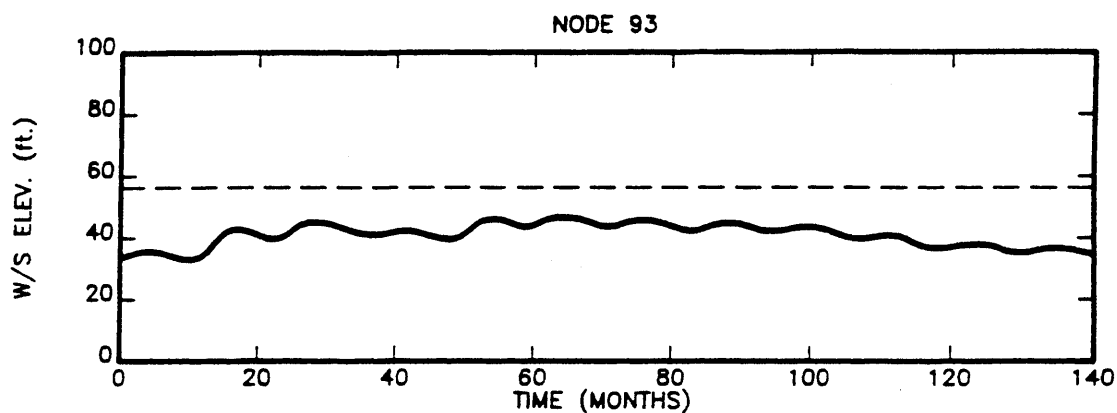
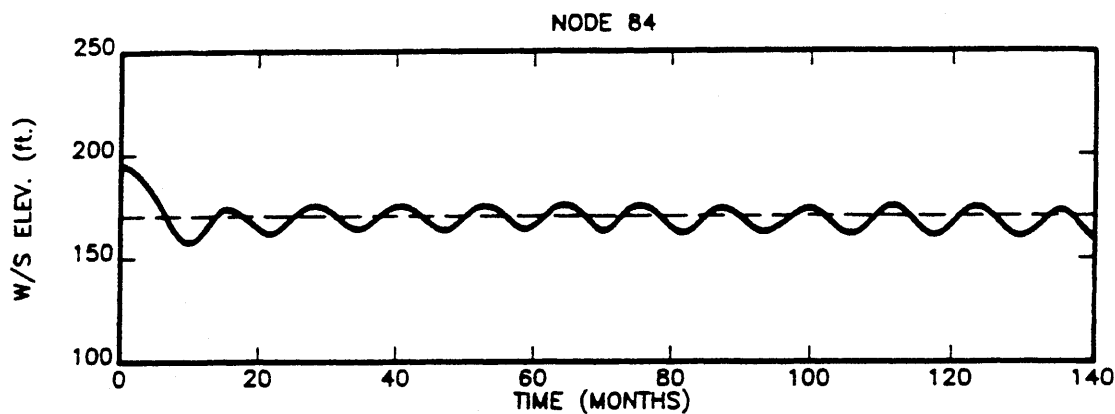
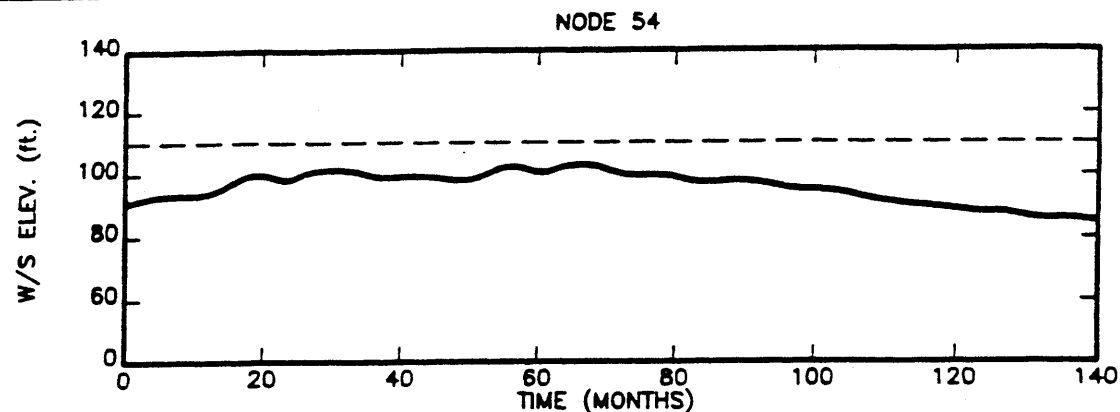
Table 3-4 compares historical and simulated groundwater quality at selected nodes in the mathematical model. As can be seen, simulated results are similar to historical sparse data that was previously described.

Simulation of both groundwater levels and groundwater quality aided in calibrating the model since one would act as a constraint to the other. Thus, choices in varying parameters and boundary conditions were limited, improving the calibration.



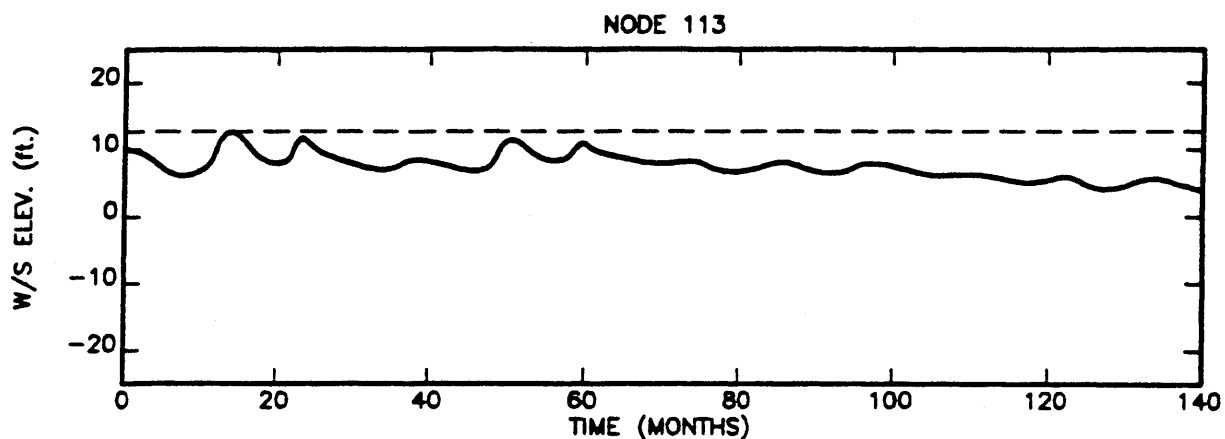
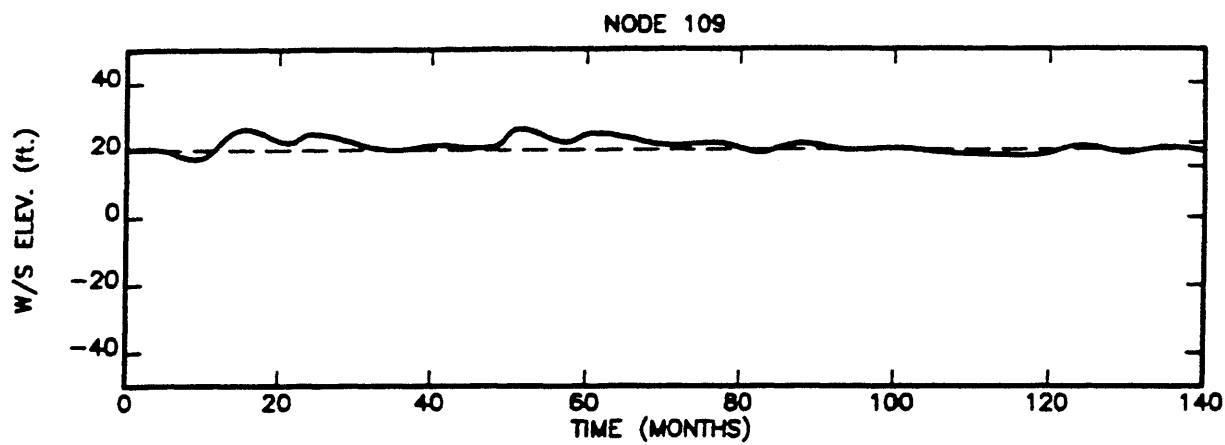
LEGEND
 SOLID LINE: SIMULATED
 DASH LINE: MEASURED 1987

| | | |
|--|-------|-----------------|
| San Juan Basin Authority | | |
| SIMULATED HISTORIC WATER LEVELS, NODES 11,14,20,38 OF THE SAN JUAN BASIN MODEL | | |
| NBS | LOWRY | SCALE: AS SHOWN |
| | | FIGURE 3-3 |



LEGEND
 SOLID LINE: SIMULATED
 DASH LINE: MEASURED 1987

| San Juan Basin Authority | | |
|---|-------|-----------------|
| SIMULATED HISTORIC WATER LEVELS, NODES 54,84,93,102 OF THE SAN JUAN BASIN MODEL | | |
| NBS | LOWRY | SCALE: AS SHOWN |
| | | FIGURE 3-4 |



LEGEND

SOLID LINE: SIMULATED
DASH LINE: MEASURED 1987

San Juan Basin Authority

**SIMULATED HISTORIC WATER LEVELS,
NODES 109,113 OF THE
SAN JUAN BASIN MODEL**

NBS

LOWRY

SCALE: AS SHOWN

FIGURE 3-5

TABLE 3-3
ESTIMATED AVERAGE WATER QUALITY
TDS VALUES FOR TRIBUTARIES
TO THE SAN JUAN BASIN*

| Tributary | Current (TDS) | |
|----------------------|---------------|-----------|
| | Storm | Non-Storm |
| Upper/Middle Trabuco | 150 | 500 |
| Oso Creek | 600 | 2,193 |
| Canada Gobernadora | 200 | 750 |
| Horno Creek | 600 | 5,200 |
| Canada Chiquita | 200 | 800 |
| Bell Canyon | 150 | 350 |
| Upper San Juan Creek | 150 | 300 |

* From Nolte and Associates

TABLE 3-4
COMPARISON OF HISTORICAL AND SIMULATED
GROUNDWATER QUALITY

| Node Number | Historical TDS (mg/l) | Simulated Current Condition TDS (mg/l) |
|-------------|-----------------------|--|
| 29 | 574 | 547 |
| 48 | 812 | 737 |
| 70 | 972 | 851 |
| 85 | 586 | 539 |
| 87 | 1,850 | 1,944 |
| 79 | 1,560 | 1,394 |
| 97 | 1,198 | 1,125 |
| 105 | 1,164 | 1,131 |
| 116 | 1,930 | 1,947 |

Note: See Figure 3-1 for location of node numbers.

CHAPTER 4

OPERATIONAL STUDIES AND IMPLEMENTATION PLAN

STUDY PERIOD

A 24-year period was selected for operational studies. The first 12 years of the period included the 12-year historic period where historical conditions of precipitation, extractions, etc. were used in the model. The last 12-year period, 1991-2004, employed the same historical conditions for land use, precipitation and pan evaporation, and historical pumping. Superimposed on these conditions were additional pumpage in various areas of the basin and artificial recharge of water in various areas of the basin. Only the lower basins were manipulated. The Upper San Juan Basin was assumed to be operated in the same historical manner.

PRELIMINARY OPERATIONAL STUDIES

The purpose of preliminary studies was to screen a number of possible management scenarios to identify the most promising management strategies for more detail study. Among management variables studied were best location of new wells and artificial recharge sites and storage characteristics of the basin for various amounts of annual pumpage and recharge. Over 25 different schemes were looked at.

Based upon these preliminary numerical simulations, the following concepts emerged:

- 1) The lower basins can store water over moderately long periods of time for use in drought periods; however, there is a penalty because some of this water will be lost to subsurface outflow unless water table gradients at the coastline are controlled to minimize subsurface outflow to the ocean.
- 2) Three primary management strategies emerged.
 - a) A no ocean outflow barrier.
 - b) A recharge ocean outflow barrier.
 - c) An extraction ocean outflow barrier.
- 3) Outflow barrier strategies can also be used to minimize seawater intrusion and thus limit the TDS of extracted groundwater in the Lower San Juan Basin.
- 4) Any one strategy can be implemented in a way to minimize seawater intrusion and consequently minimize TDS in the Lower San Juan Basin.
- 5) Inducing seawater inflow will increase sustained yield.

- 6) Absolute pumping amounts from any one well were limited by the depth of sediments which are relatively shallow throughout the basin.
- 7) Rising water can be limited by pumping; however, excessive amounts of recharge will lead to lost water through rising water.

It was assumed that for all of the various management schemes investigated, desalination would be implemented and there was therefore no need to explicitly manage the basin to maximize groundwater quality. It was assumed that groundwater quality in the Lower San Juan Basin would remain marginal or could deteriorate somewhat due to seawater intrusion.

FINAL OPERATIONAL STUDIES

The guiding strategy adopted for the three management strategies identified in the preliminary management studies was to maximize extractions over various periods of time. That is, what would be the maximum that could be extracted over a one-year period, a three-year period, etc? Maximum pumping of new wells will also include minimizing subsurface outflow to the ocean and outflow due to rising water. Generally three-year drought pumping periods will be considered because of potential financial incentives that may be provided by MWDSC.

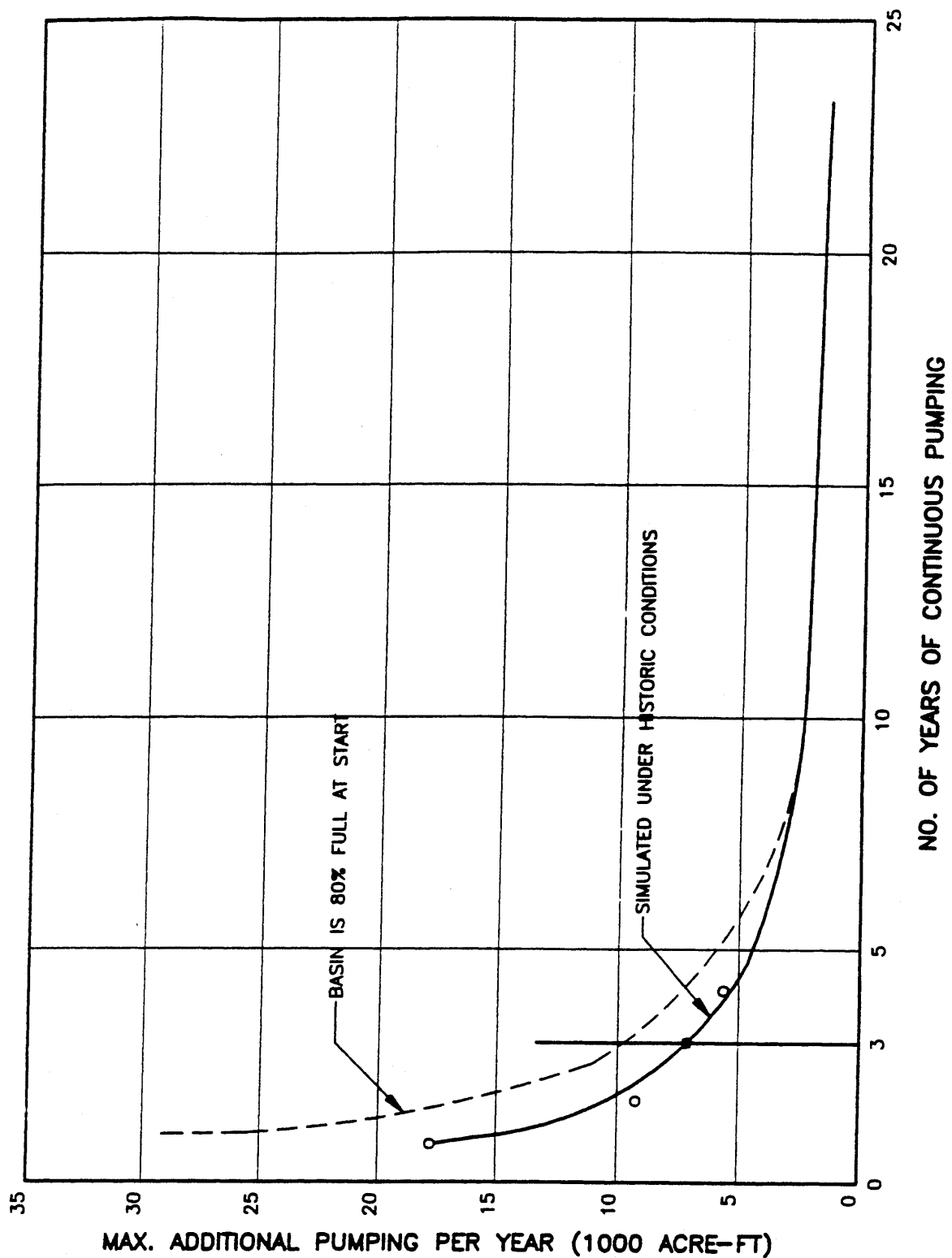
There are advantages to the timing of artificial recharge. In the various final management alternative studies artificial recharge was assumed to occur after major pumping times. This scheme tends to minimize both subsurface outflow to the ocean and outflow due to rising water.

No-Barrier Scenario

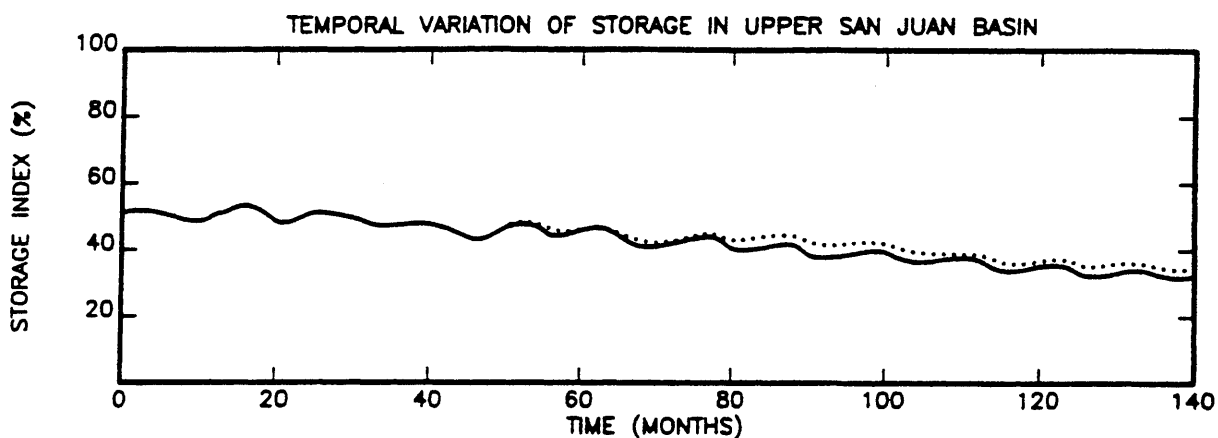
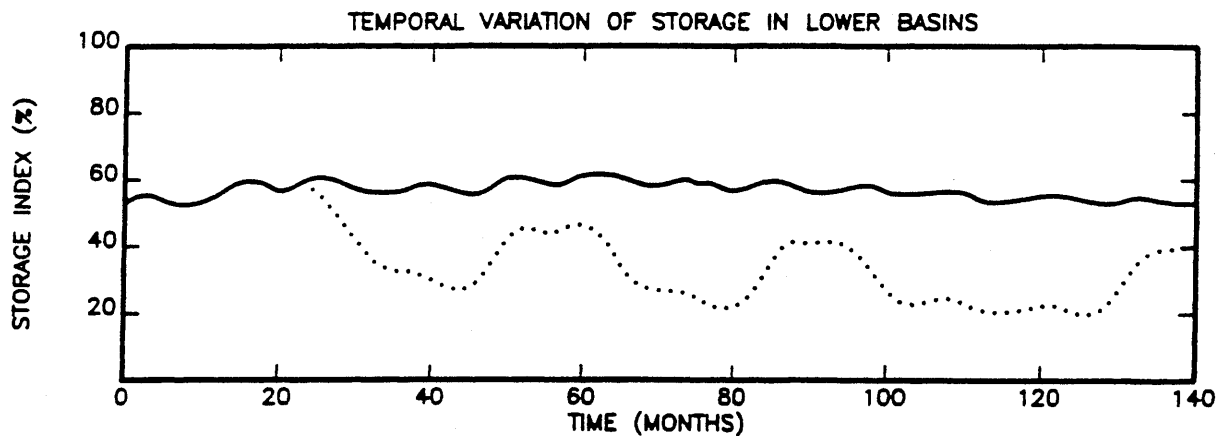
The no barrier to seawater intrusion scenario was simulated for two initial conditions: by assuming historical conditions of groundwater storage in the San Juan Basin and by assuming the basin is 80 percent full at the start of the simulation period; i.e., the basin would first be recharged by artificial means.

Figures 4-1 and 4-2 show the results of this simulation scenario. Pumping amounts are presented in terms of additional pumping over historic 1990 pumping which was assumed to continue at a constant rate into the future. Examination of Figure 4-1 shows that, for example, if pumping was to occur over a three-year period, the average annual additional pumping would be about 7,000 acre-feet per year under historic conditions of groundwater storage and about 9,000 acre-feet per year if the basin was initially 80 percent full. More dramatic benefits to having the basin 80 percent full can be achieved by shorter durations of pumping. One of the main reasons pumping rates drop off so rapidly is that the shallow alluvial sediments become partly dewatered, lowering simulated pumped volumes.

Figure 4-2 shows the simulated storage of groundwater in both the lower basins and the Upper San Juan Basin for natural historical conditions for the last 12 years of the study period. As can be seen, the Upper San Juan Basin is unaffected while pumpage and recharge markedly influence the lower basins. It will be noticed from the downward trend of the simulations (dotted line) that the basin was overdrafted somewhat.



| | | |
|--|-------|-----------------|
| San Juan Basin Authority | | |
| SIMULATED ADDITIONAL GROUNDWATER PUMPAGE AND DURATION, NO BARRIER SCENARIO, FOR THE SAN JUAN BASIN | | |
| NBS | LOWRY | SCALE: AS SHOWN |
| | | FIGURE 4-1 |



LEGEND

SOLID LINE: SIMULATED HISTORIC
DASH LINE: SIMULATED FUTURE

San Juan Basin Authority

**SIMULATED GROUNDWATER STORAGE
DUE TO ADDITIONAL PUMPAGE UNDER
NATURAL CONDITIONS, NO BARRIER
SCENARIO FOR THE SAN JUAN BASIN**

NBS

LOWRY

SCALE: AS SHOWN

FIGURE 4-2

For this particular scenario, it is estimated that the total pumped water in the lower basins would have an average TDS of about 1,500 to 2,000 mg/l.

Pumping Barrier Scenario

This scenario is similar to the no-barrier scenario in terms of assumptions; however, in this case seawater inflow to the main part of the Lower San Juan Basin or outflow to the ocean is controlled by an assumed series of wells near the coast that pump from the aquifer to control the water table gradient. The amount of pumping was somewhat guided by an assumption that total extractions are to be as high as possible.

Figures 4-3 and 4-4 show results for this scenario. Figure 4-3 shows results in terms for additional pumping as was previously described. For this simulation, an average annual 4,800 acre-feet per year was pumped near the coast. For a three-year withdrawal scheme, about the same amount of additional pumping can be achieved as the no-barrier scenario. For shorter periods, however, dramatically increased amounts can be achieved over the no-barrier scenario.

Figure 4-4 shows the simulated groundwater storage for this scenario assuming natural conditions of groundwater storage for the 12-year ending portion of the simulation period. This figure indicates a simulated overdraft for the basin.

Estimated groundwater quality for this scenario, assuming extracted water from the barrier project is commingled with all other lower basin-pumped groundwater, is from 11,000 to 13,000 mg/l. There is a substantial groundwater quality penalty to pay for a pumped barrier project compared to other alternatives.

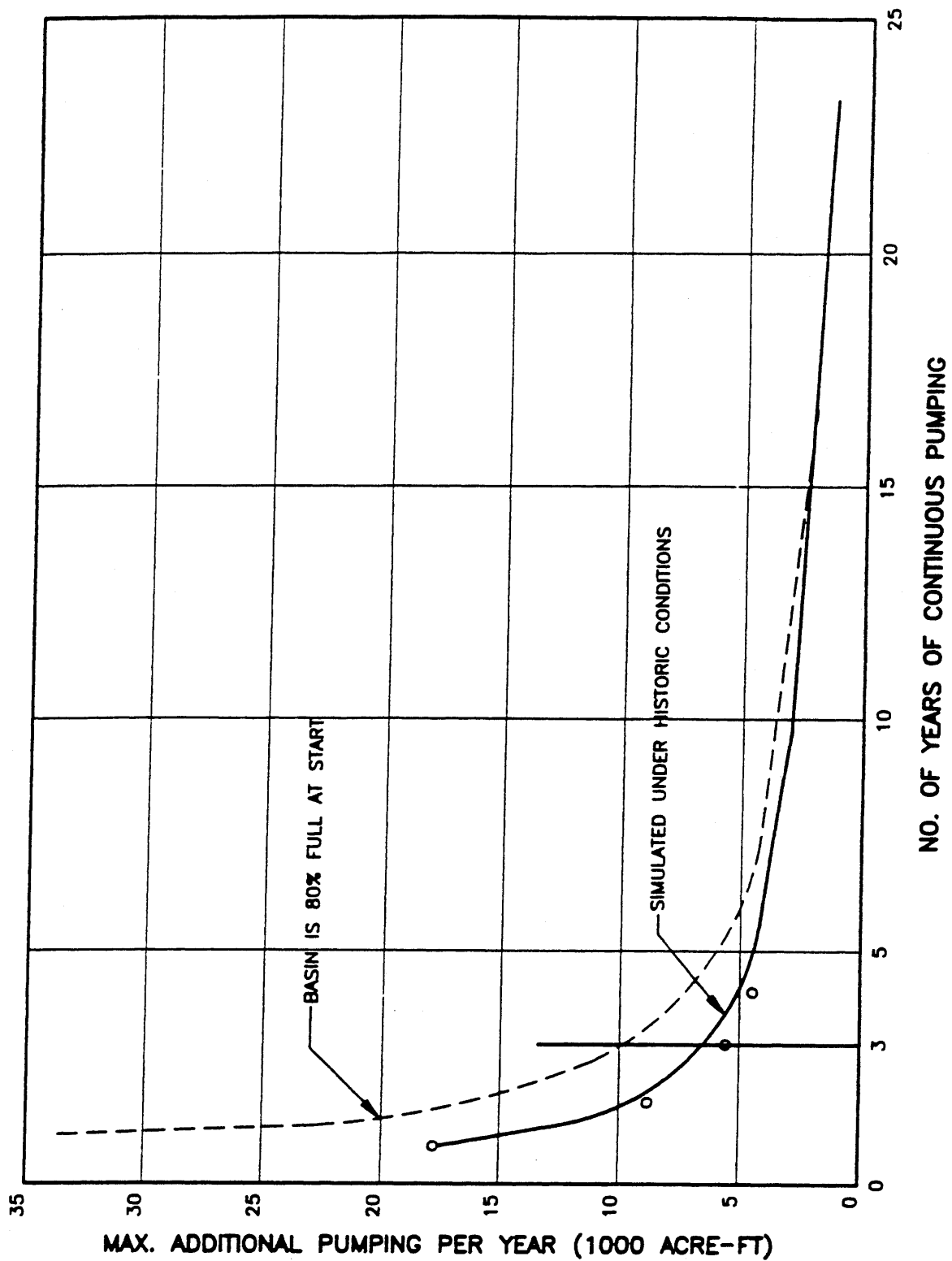
Recharge Barrier Project

This scenario is similar to the others except recharge is assumed near the coast to eliminate seawater intrusion. Figures 4-5 and 4-6 present the results of this simulation. As can be seen from Figure 4-5, there would be an increase of short-term pumping over the other scenarios for a three-year pumping period. For a three-year period about 9,000 acre-feet per year of additional water could be extracted under existing conditions of groundwater storage and about 11,500 acre-feet per year could be extracted if the lower basin were initially 80 percent full. Simulations include about 2,200 acre-feet of well recharge at the coast.

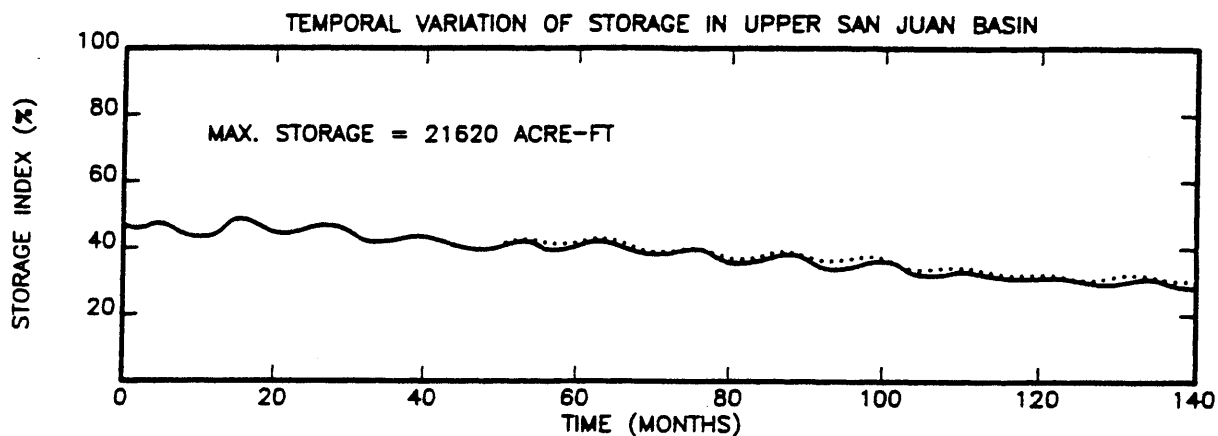
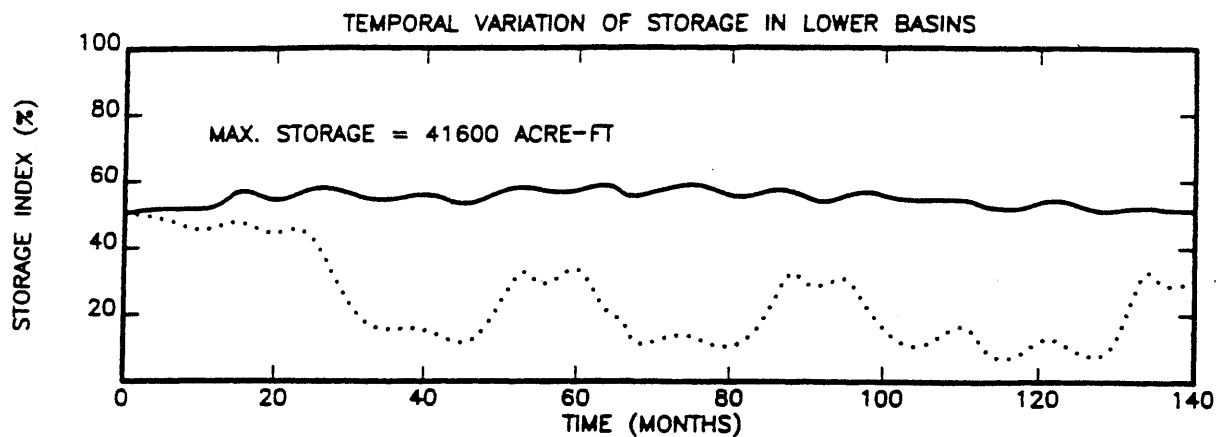
Figure 4-6 shows the simulated storage for the last 12-year period of the study period under natural conditions. This figure indicates an overdraft during the 12-year period. Estimated average pumped groundwater quality for this scenario is from 1,200 to 1,700 mg/l.

EVALUATION OF MANAGEMENT STRATEGIES

Preliminary studies suggest a strategy of using the lower basins (i.e., the Middle San Juan, Lower San Juan, and Lower Trabuco Basins) for short-term maximum groundwater withdrawals in times of drought. Additionally, based upon historical conditions, a total of about 5,200 acre-feet per year of naturally occurring groundwater can be pumped each year from the San Juan Basin without overdraft, provided the basin is managed to minimize subsurface outflow and



| | | |
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| San Juan Basin Authority | | |
| SIMULATED ADDITIONAL GROUNDWATER PUMPAGE AND DURATION, PUMPING BARRIER SCENARIO, FOR THE SAN JUAN BASIN | | |
| NBS LOWRY | SCALE: AS SHOWN | FIGURE 4-3 |



LEGEND

SOLID LINE: SIMULATED HISTORIC
DASH LINE: SIMULATED FUTURE

San Juan Basin Authority

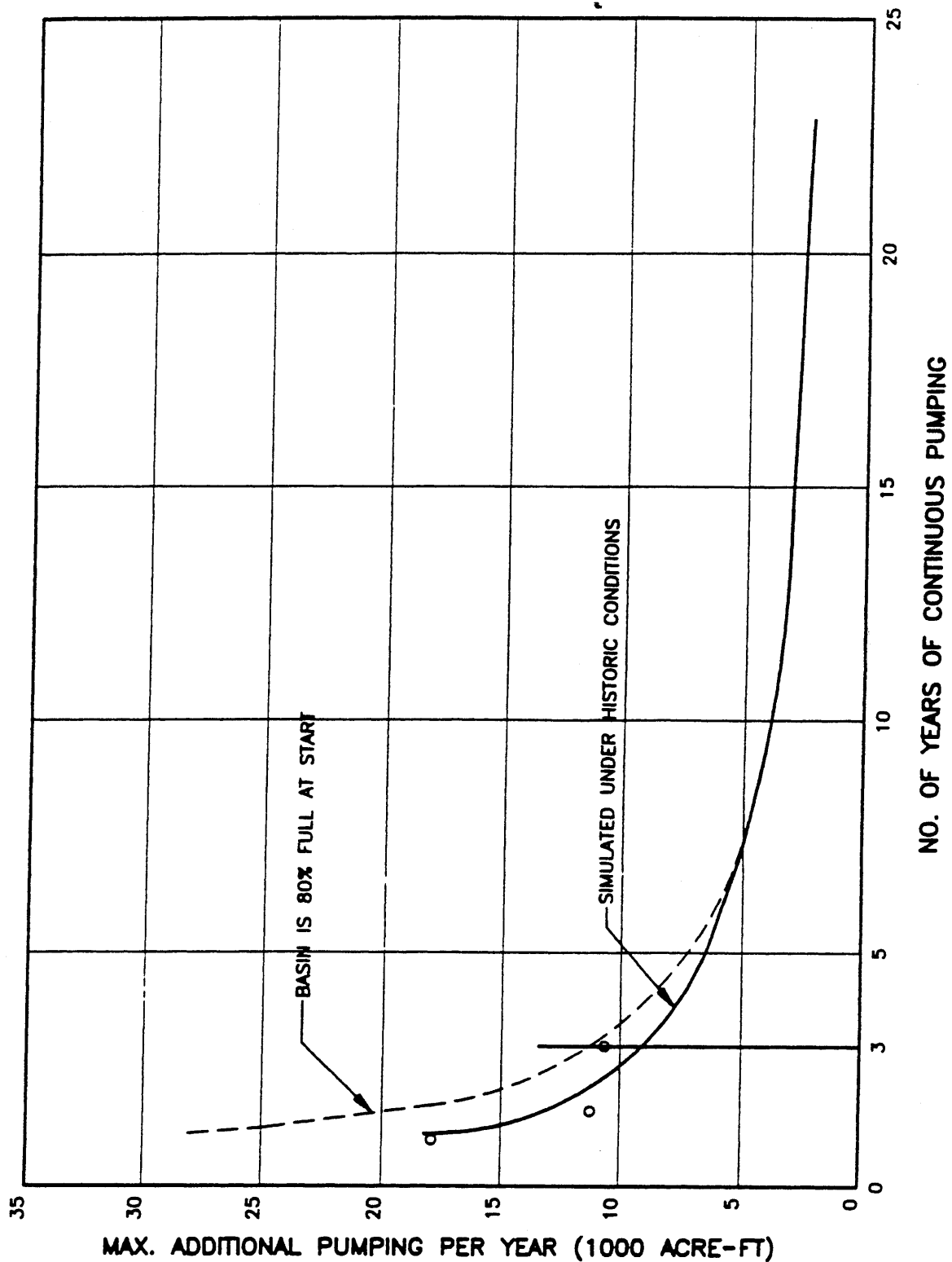
**SIMULATED GROUNDWATER STORAGE
DUE TO ADDITIONAL PUMPAGE UNDER
NATURAL CONDITIONS, PUMPING BARRIER
SCENARIO FOR THE SAN JUAN BASIN**

NBS

LOWRY

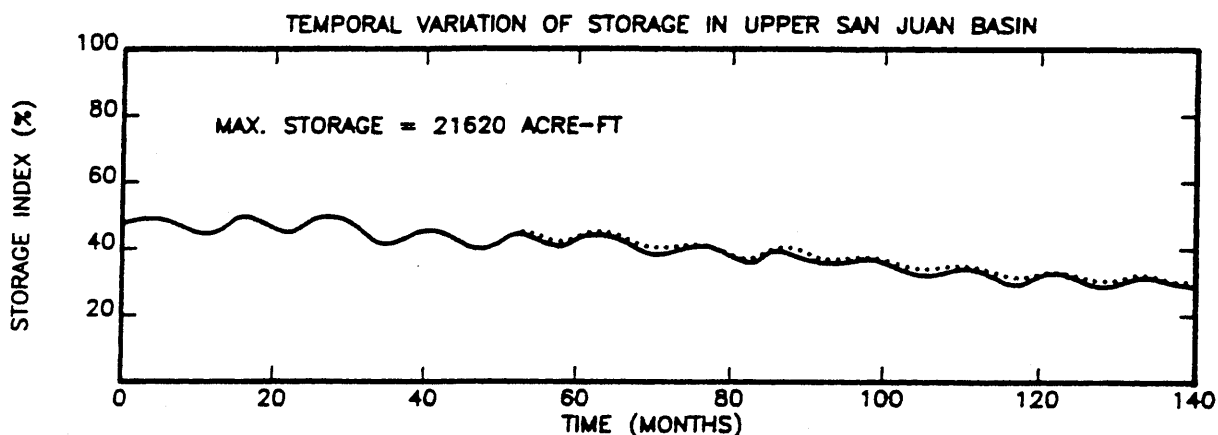
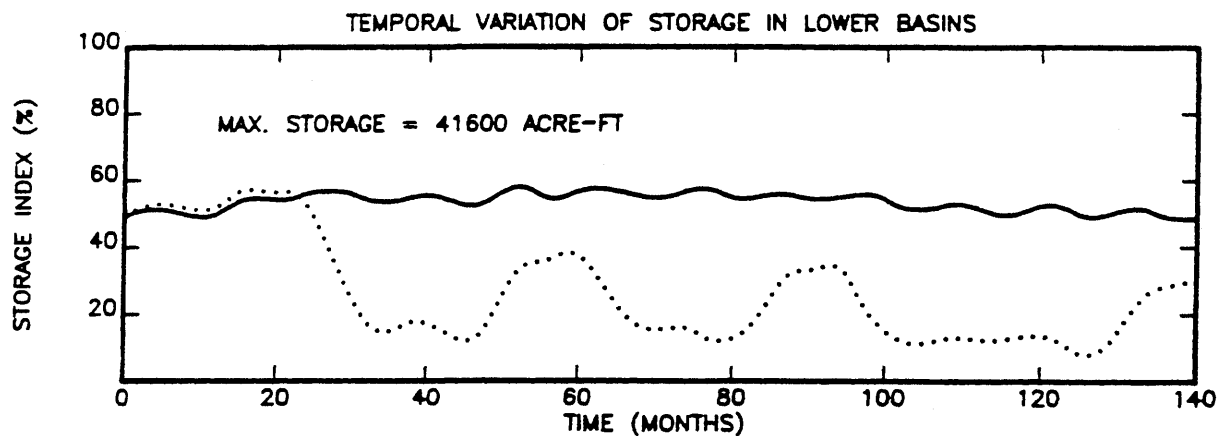
SCALE: AS SHOWN

FIGURE 4-4



San Juan Basin Authority
SIMULATED ADDITIONAL GROUNDWATER
PUMPAGE AND DURATION, RECHARGE
BARRIER SCENARIO, FOR
THE SAN JUAN BASIN

| | | |
|------------|--------------|-----------------|
| NBS | LOWRY | SCALE: AS SHOWN |
| | | FIGURE 4-5 |



LEGEND
 SOLID LINE: SIMULATED HISTORIC
 DASH LINE: SIMULATED FUTURE

| San Juan Basin Authority | | |
|--|-------|-----------------|
| SIMULATED GROUNDWATER STORAGE DUE TO ADDITIONAL PUMPAGE UNDER NATURAL CONDITIONS, RECHARGE BARRIER SCENARIO FOR THE SAN JUAN BASIN | | |
| NBS | LOWRY | SCALE: AS SHOWN |
| | | FIGURE 4-6 |

rising water (Table 2-3). In the future, sustained yield is expected to increase due to additional flows into the San Juan Basin resulting from landscape irrigation runoff from imported water used for irrigation in tributary areas.

The amount of annual water that can be withdrawn depends on the management constraints that are imposed. For example, if one-year maximum amounts are extracted, it is advantageous to partly fill the basin initially. In this study 80 percent full was assumed since it is obvious that one can not completely fill the basin without damaging surface structures. If the incremental cost per feedwater salt load of desalination is high, then a pumped barrier project may not be the best strategy. If a short-term maximum groundwater extraction scheme were adopted and it was desirable to minimize TDS while limiting subsurface outflow to the ocean, some form of control of coastal water table gradients would be implied.

The main variables in a management strategy for the San Juan Basin are:

- 1) Length of groundwater withdrawal period and amount of withdrawal.
- 2) Initial groundwater in storage in the lower basins.
- 3) Feedwater quality to a desalting facility which may imply some limits on permissible seawater intrusion.
- 4) Amounts and timing of artificial recharge which implies a limit on rising water and subsurface outflow to the ocean.

Comparisons of the results of the various scenarios under historic groundwater storage conditions suggest that the total sustained yield for the no-barrier scenario about equals the estimated historical sustained yield while the pumping barrier scenario significantly increased sustained yield. The recharge barrier scenario actually decreased sustained yield. If maximization of sustained yield of natural waters is an objective, a no-barrier or pumping barrier management technique is the best depending on the economics of treating various levels of TDS in the feed stream to a desalting facility.

Under careful management of the San Juan Basin, a sustained yield of natural in situ groundwater of about 5,200 acre-feet is probably available. However, should additional filling of the basin occur either naturally or through artificial recharge, there is no reason why the basin might not be overdrafted for a long period until, say, major new water supplies become available to the region. As was mentioned previously, future sustained yield will increase due to landscape irrigation return flows. This aspect will be subsequently discussed further.

A second significant use of the lower San Juan basins is short-term pumping to provide supplemental water during drought periods. The no-barrier and pumping barrier scenarios produce about the same amount of yield while the recharge barrier scenario has significantly increased amounts for short-term pumping. The main constraint on how much can be pumped is the initial groundwater in storage and the thickness of saturated sediments. It is physically impossible to pump more from fixed well sites because sediments become dewatered under prolonged pumping.

It is estimated that approximately 800 acre-feet per year are used by two golf courses and the Vermuellen agricultural areas in the lower basins. Several large groundwater pumpers are also located in the Upper San Juan Basin where superior groundwater quality is found. While it may not be possible to supply these areas in the immediate future, a long-range plan should be formulated to additionally treat existing wastewater and provide reclaimed water service to selected areas. It may also be feasible to use reclaimed water for recharge at the coast to improve water quality. The success in implementing the use of reclaimed water will depend primarily on local policy, regulatory agency approval, and the willingness of local pumpers to accept such a plan. Implementation would largely remove most pumpers from the lower basins, making it easier to manage under one authority.

The initial management strategy to conjunctively utilize the San Juan Basin should be a combination no-barrier/pumping barrier strategy to manage groundwater gradients at the coast. By combination strategy, it is meant that a formal pumping barrier would not be constructed but production wells would be located close enough to the coast so that landward groundwater gradients could be achieved. Initial facilities required would consist of a desalting facility, extraction wells and pipe manifold, and recharge facilities. These facilities would meet the following needs:

- 1) Provide short-term drought water supplies.
- 2) Provide long-term "new water" supplies for the region.
- 3) Provide additional summer peaking capacity.

It was shown previously in Figures 4-1 and 4-3 that about 10,000 acre-feet per year for a three-year period could be extracted from the lower San Juan basins provided it is recharged in subsequent years (i.e., a two- or three-year recharge period). Greater rates can be extracted for shorter periods.

Long-term "new water" supplies will depend upon how much seawater intrusion is induced and to what extent reclaimed water is used for current irrigation uses or recharge. The amount of seawater intrusion that may be induced depends upon the economics of treating various levels of feedwater TDS. Future sustained yield will depend upon control of rising water and outflow to the ocean. Inflow of landscape irrigation return flows will increase "new water" to the system. The benefits of replacing existing irrigation pumping with reclaimed water would be significant by increasing pumping of natural waters to blend with induced seawater intrusion.

A third use of the lower basins is for summer peak demands. Water could be recharged in the winter months and well extractions could be in the high demand summer months. The amounts of recharge and well extraction would depend on the capacity of a desalting facility and the amount of groundwater in storage at the beginning of the pumping period.

A best conjunctive use management strategy applicable to the lower basins should have the following goals:

- 1) Flexibility which implies staging or phasing of structural management facilities.

- 2) Elimination of subsurface outflow by controlling groundwater gradients at the coast to maximize sustained yield of natural in situ groundwaters.
- 3) Using the San Juan Basin as a storage element in the South County facilities.
- 4) Inducing seawater intrusion to increase water available for a desalting facility.
- 5) Eventual replacement of current pumping by large landscape irrigation users with reclaimed water increasing the amount of groundwater available to the project.

FUTURE SUSTAINED YIELD

As discussed previously, sustained yield of the natural groundwaters of the basin under historical conditions is on the order of 5,200 acre-feet per year, provided no subsurface outflow to the ocean or rising water occur. Historical pumping (Table 2-3), if the estimates of pumpage are correct, caused a slight overdraft of the basin, about 200 acre-feet per year. From a strategic point of view, it is probably better to overdraft the basin slightly to make additional storage available for recharge during wet years such as occurred in the 1993 winter. A slight overdraft will also facilitate minimizing rising water outflow.

Future sustained yield will be increased due to increased inflows resulting from landscape irrigation return flows, which will increase subsurface inflow from tributary areas and increase stream baseflow which will result in increased streambed percolation in the main basin. Tributary irrigation with imported water in tributary areas at ultimate buildout is estimated to be 25,339 acre-feet per year (Table 4-1). Assuming 15 percent of this value is return flow to the main San Juan Basin, 3,800 acre-feet per year of new water will be available. Add historic sustained yield of 5,200 acre-feet per year to this value and ultimate sustained yield will be about 9,000 acre-feet per year. Current sustained yield is roughly estimated by assuming 40 percent buildout in tributary areas; thus, 40 percent of the ultimate imported water irrigation in tributary areas yields 10,100 acre-feet per year. Fifteen percent of this value, or 1,500 acre-feet per year, is the estimated current return flow to the main San Juan Basin, and adding this value to historic sustained yield yields an estimated current sustained yield of 6,700 acre-feet per year. The average sustained yield over the 25-year future life of the proposed project is 7,800 acre-feet per year. Subtracting current pumpage of 5,600 acre-feet per year results in an additional average sustained yield of 2,200 acre-feet per year available to this project.

According to Nolte and Associates, future landscape irrigation in some of the tributary watersheds may be partly or wholly augmented by reclaimed water. While the use of reclaimed water will not alter predicted increased inflows to the main basin, there may be water quality effects which will subsequently be evaluated. Table 4-2 presents estimates of future water quality of inflows with and without reclamation. Non-storm estimates apply to baseflow and subsurface inflow.

TABLE 4-1**SAN JUAN BASIN AVERAGE TRIBUTARY INFLOWS
ORIGINATING FROM IRRIGATION
(FROM NOLTE AND ASSOCIATES)**

| Tributary | Irrigated Area (Ac) | Applied Irrigation Water (Ac-Ft/Yr) |
|----------------------|--------------------------------|--|
| Upper/Middle Trabuco | 1,554 | 5,439 |
| Oso Creek | 3,637 | 12,730 |
| Canada Gobernadora | 1,810 | 6,335 |
| Horno Creek | 625 | 2,188 |
| Canada Chiquita | 1,186 | 4,151 |
| Bell Canyon | 773 | 2,707 |
| Upper San Juan Creek | <u>26</u> | <u>91</u> |
| Totals | 9,611 | 25,339 |

Note: Estimates are for ultimate buildout in the tributary areas.

TABLE 4-2

**ESTIMATED AVERAGE WATER QUALITY
FOR SAN JUAN BASIN TRIBUTARY INFLOWS
(FROM NOLTE AND ASSOCIATES)**

| Tributary | <u>Future with Reclamation (TDS)</u> | | <u>Future without Reclamation (TDS)</u> | |
|----------------------|--|-----------|---|-----------|
| | Storm | Non-Storm | Storm | Non-Storm |
| Upper/Middle Trabuco | 163 | 771 | 148 | 700 |
| Oso Creek | 630 | 1,941 | NA | NA |
| Canada Gobernadora | 242 | 1,191 | 223 | 1,101 |
| Horno Creek | 880 | 3,759 | 749 | 3,199 |
| Canada Chiquita | 203 | 1,312 | 177 | 1,144 |
| Bell Canyon | 228 | 455 | NA | NA |
| Upper San Juan Creek | 151 | 302 | NA | NA |

Note: Future implies ultimate buildout in the tributary areas. NA means non-applicable since further development of the watersheds is either not contemplated or reclamation is currently accommodated and is planned to continue in the future without change. Subsurface inflow from tributaries was assumed to have the same TDS of non-storm flows. TDS in mg/l.

IMPLEMENTATION PLAN

Based upon the above operation studies, an ultimate plan is proposed that will involve an 8 mgd desalter facility with a feedwater requirement of about 12,500 acre-feet per year. Feedwater would be provided by a number of new wells installed in the lower basins. To be conservative it is assumed that 12 wells would be constructed, of which some may be dual extraction-injection wells. Some of these wells would be to control groundwater gradients at the coast. Wells would be connected to a collection manifold. A product waterline and pump station to CVWD facilities and the South County Pipeline and a brine line would be required as part of the project. Ultimate facilities are illustrated in Figure 4-7.

There are, however, a number of uncertainties involved in an ultimate system to manage groundwaters of the San Juan Basin. These include: (1) resolution of water rights, (2) completion of the CEQA process, (3) acceptance of the concept of induced seawater inflow, (4) long-term groundwater quality that will influence the design and operation of a desalter, (5) future availability of incentive programs, and (6) the development of a management and operations infrastructure. These uncertainties can be resolved with a reasonable level of confidence by implementing a phased development program. The key concepts are flexibility, phasing and prototype demonstration.

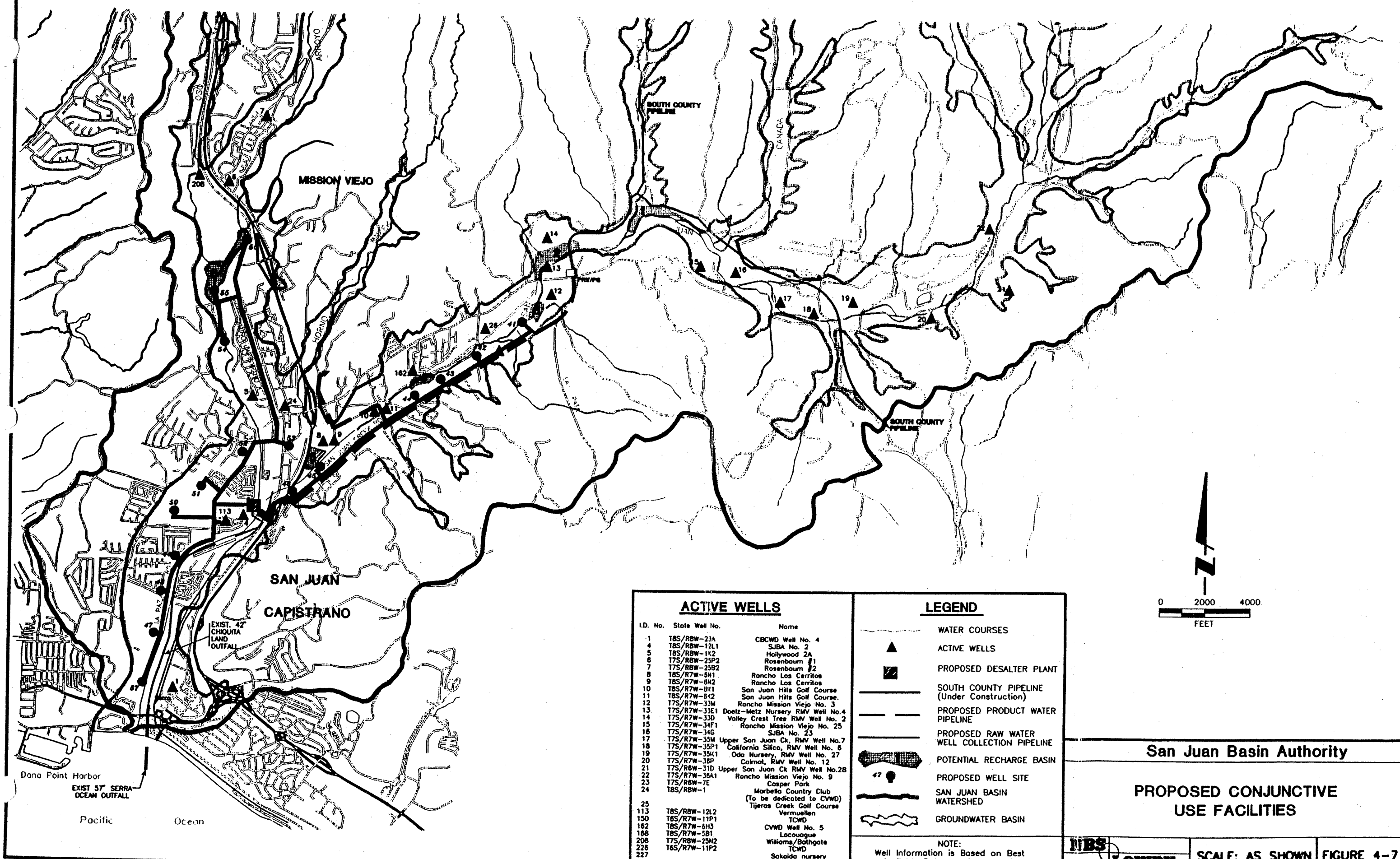
A two-phase project is proposed. The first phase would capture natural unused groundwaters without inducing significant seawater intrusion. The second phase would expand facilities developed in the first phase depending upon experience gained during the first phase. Once preliminary management facilities are constructed, a management and institutional infrastructure begins to form, and operational experience is gained as well as more knowledge about the characteristics of the San Juan Basin. This experience will be a basis for developing and implementing an ultimate optimum management plan.

Phase I

The proposed objectives of Phase I are to:

- 1) Capture and desalt the unused sustained yield of the lower basins of about 2,200 acre-feet per year.
- 2) Provide sufficient pumping and desalting capacity to provide some drought and emergency protection.
- 3) Commence a limited use of the lower basins for seasonal storage and pumpage.
- 4) Develop a management-operations infrastructure which would include involvement in MWDSC incentive programs; and
- 5) Obtain and evaluate technical data to develop Phase II.

Both a resolution of water-rights issues and the CEQA process must be completed before implementing Phase I.



| ACTIVE WELLS | | |
|--------------|----------------|---|
| I.D. No. | State Well No. | Name |
| 1 | T8S/RBW-23A | CBCWD Well No. 4 |
| 4 | T8S/RBW-12L1 | SJBA No. 2 |
| 5 | T8S/RBW-1K2 | Hollywood 2A |
| 6 | T7S/RBW-25P2 | Rosenbourn 1 |
| 7 | T7S/RBW-25B2 | Rosenbourn 2 |
| 8 | T8S/R7W-8N1 | Rancho Los Cerritos |
| 9 | T8S/R7W-8N2 | Rancho Los Cerritos |
| 10 | T8S/R7W-8K1 | San Juan Hills Golf Course |
| 11 | T8S/R7W-8K2 | San Juan Hills Golf Course |
| 12 | T7S/R7W-33M | Rancho Mission Viejo No. 3 |
| 13 | T7S/R7W-33E1 | Doelz-Metz Nursery RMV Well No. 4 |
| 14 | T7S/R7W-33D | Valley Crest Tree RMV Well No. 2 |
| 15 | T7S/R7W-34F1 | Rancho Mission Viejo No. 25 |
| 16 | T7S/R7W-34G | SJBA No. 23 |
| 17 | T7S/R7W-35M | Upper San Juan Ck. RMV Well No. 7 |
| 18 | T7S/R7W-35P1 | California Silco, RMV Well No. 6 |
| 19 | T7S/R7W-35K1 | Oda Nursery, RMV Well No. 27 |
| 20 | T7S/R7W-36P | Calmat, RMV Well No. 12 |
| 21 | T7S/RBW-31D | Upper San Juan Ck. RMV Well No. 28 |
| 22 | T7S/R7W-38A1 | Rancho Mission Viejo No. 9 |
| 23 | T7S/RBW-7E | Casper Park |
| 24 | T8S/RBW-1 | Marbella Country Club (To be dedicated to CVWD) Tijeras Creek Golf Course |
| 25 | T8S/RBW-12L2 | Vermuellen |
| 113 | T6S/R7W-11P1 | TCWD |
| 150 | T8S/R7W-6H3 | CVWD Well No. 5 |
| 162 | T8S/R7W-5B1 | Locouague |
| 168 | T7S/RBW-25N2 | Williams/Bathgate |
| 208 | T7S/R7W-11P2 | TCWD |
| 228 | | Sakaida nursery |
| 227 | | |

LEGEND

WATER COURSES

ACTIVE WELLS

PROPOSED DESALTER PLANT

SOUTH COUNTY PIPELINE
(Under Construction)

PROPOSED PRODUCT WATER
PIPELINE

PROPOSED RAW WATER
WELL COLLECTION PIPELINE

POTENTIAL RECHARGE BASIN

PROPOSED WELL SITE

SAN JUAN BASIN
WATERSHED

GROUNDWATER BASIN

NOTE:
Well Information is Based on Best
Available Data as of July 1991

San Juan Basin Authority

PROPOSED CONJUNCTIVE
USE FACILITIES

SCALE: AS SHOWN

FIGURE 4-7

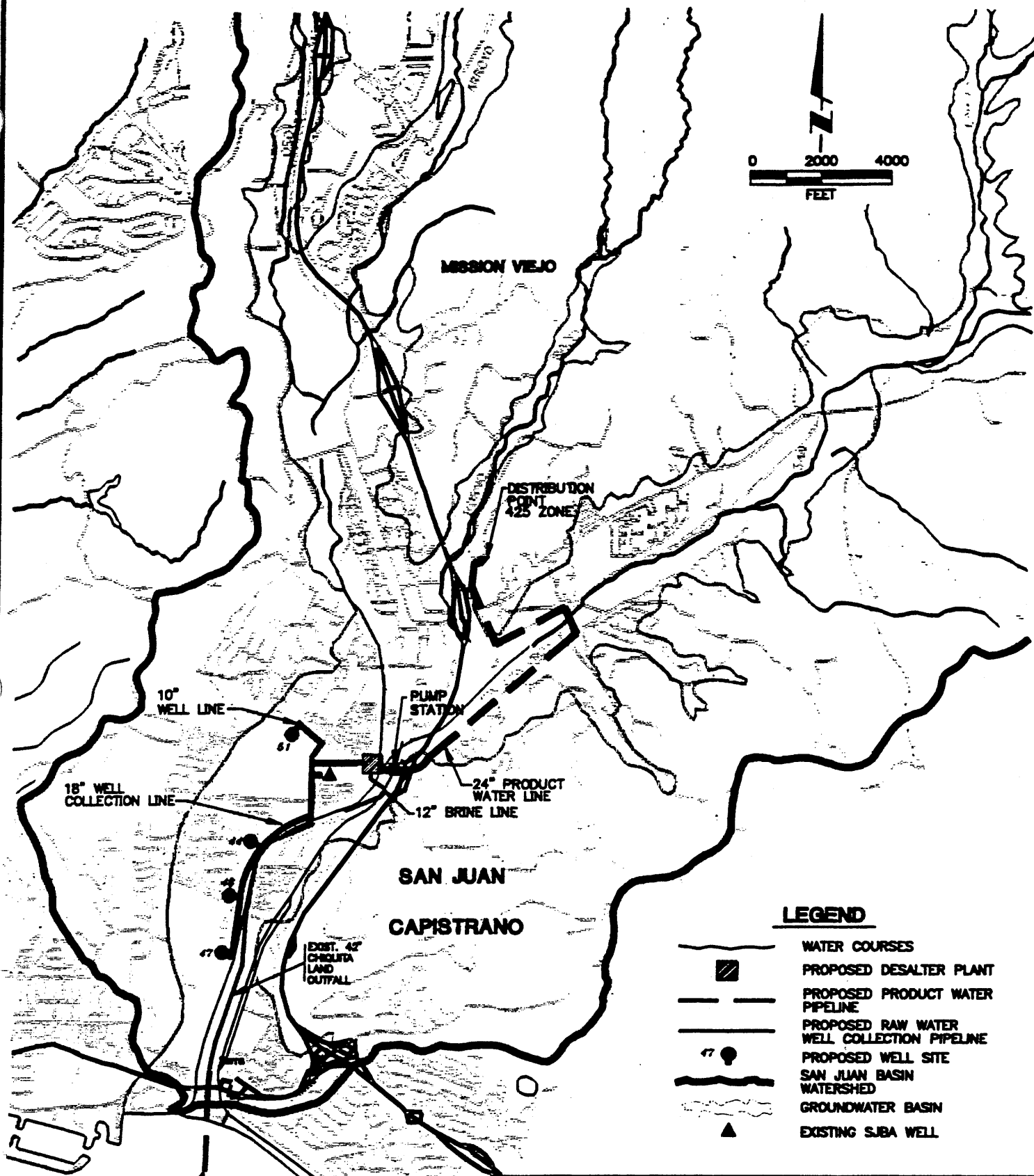
Capturing and desalting 2,200 acre-feet per year of groundwater in the Lower San Juan Basin would yield about 1,800 acre-feet per year of potable water. It is proposed that a 4 mgd desalter be constructed which would be able to produce about 4,300 acre-feet per year of potable water for drought or emergency supply. Feedwater flow pumped from groundwater would be about 5,000 acre-feet per year. Groundwater TDS would be about 2,000 mg/l when pumping 2,200 acre-feet per year and as high as 3,800 mg/l when pumping 5,000 acre-feet per year, depending upon where wells are located and pumped. Conservatively, five wells and a collection manifold would be required to do this. Several of these wells could be designed as dual extraction-injection wells to test this concept. These same wells would be used to capture the unused sustained yield and would be located to partly control groundwater gradients at the coast. Product water would be supplied to Zone 425 of the CVWD's system. Proposed Phase I facilities are illustrated in Figure 4-8.

During Phase I two modes of operation would be possible. Extract approximately 2,200 acre-feet of water during the five summer months, netting 1,800 acre-feet of potable water. This would allow maximum participation in the MWDSC seasonal storage program during the winter months. The second mode of operation would be to extract approximately 5,000 acre-feet of water over 10 to 12 months, netting 4,300 acre-feet of potable water. This second mode of operation would extract from sustained yield and stored water during drought or emergency conditions.

Recharge of extracted stored water is proposed to be through an "in-lieu" scheme. "In-lieu" imported water will be supplied to pumpers in exchange for them not pumping. This would occur in the years after a drought or other emergency to replace water pumped from storage.

During Phase I, monitoring would be conducted and further analysis will be undertaken to develop Phase II facilities and their operation and management. Figure 4-9 illustrates a project schedule for implementing Phase I.

Hypothetical simulations with the water quantity and quality models were conducted to evaluate the impacts on the San Juan Basin both for future reclamation and no reclamation in the tributary areas for Phase I operation. A 24-year future period based upon historical natural inputs and outputs similar to the 12-year period used for calibration was used. However, surface and subsurface inputs were modified to reflect increased landscape irrigation runoff from imported water in the tributary areas, Table 4-1. Historical pumping, Table 2-3, was increased by 2,200 acre-feet per year and, during two three-year drought periods, historical pumping was increased by 5,000 acre-feet per year. Of the 5,000 acre-feet per year, 2,800 is in excess of sustained yield. During the increased pumpage some minor seawater intrusion was simulated, increasing the sustained yield. The net overdraft during the three-year period of increased pumping is on the order of 2,200 acre-feet per year or a total of 6,600 acre-feet. This amount was recharged at the end of the increased pumping periods. The lumped basin inputs and outputs for this simulation are shown in Table 4-3. This table represents both future reclamation scenarios.



LEGEND

- WATER COURSES
- PROPOSED DESALTER PLANT
- PROPOSED PRODUCT WATER PIPELINE
- PROPOSED RAW WATER WELL COLLECTION PIPELINE
- PROPOSED WELL SITE
- SAN JUAN BASIN WATERSHED
- GROUNDWATER BASIN
- EXISTING SJB WELL

San Juan Basin Authority

PHASE I DESALTER CONJUNCTIVE USE FACILITIES

NBS

LOWRY

SCALE: AS SHOWN FIGURE 4-8

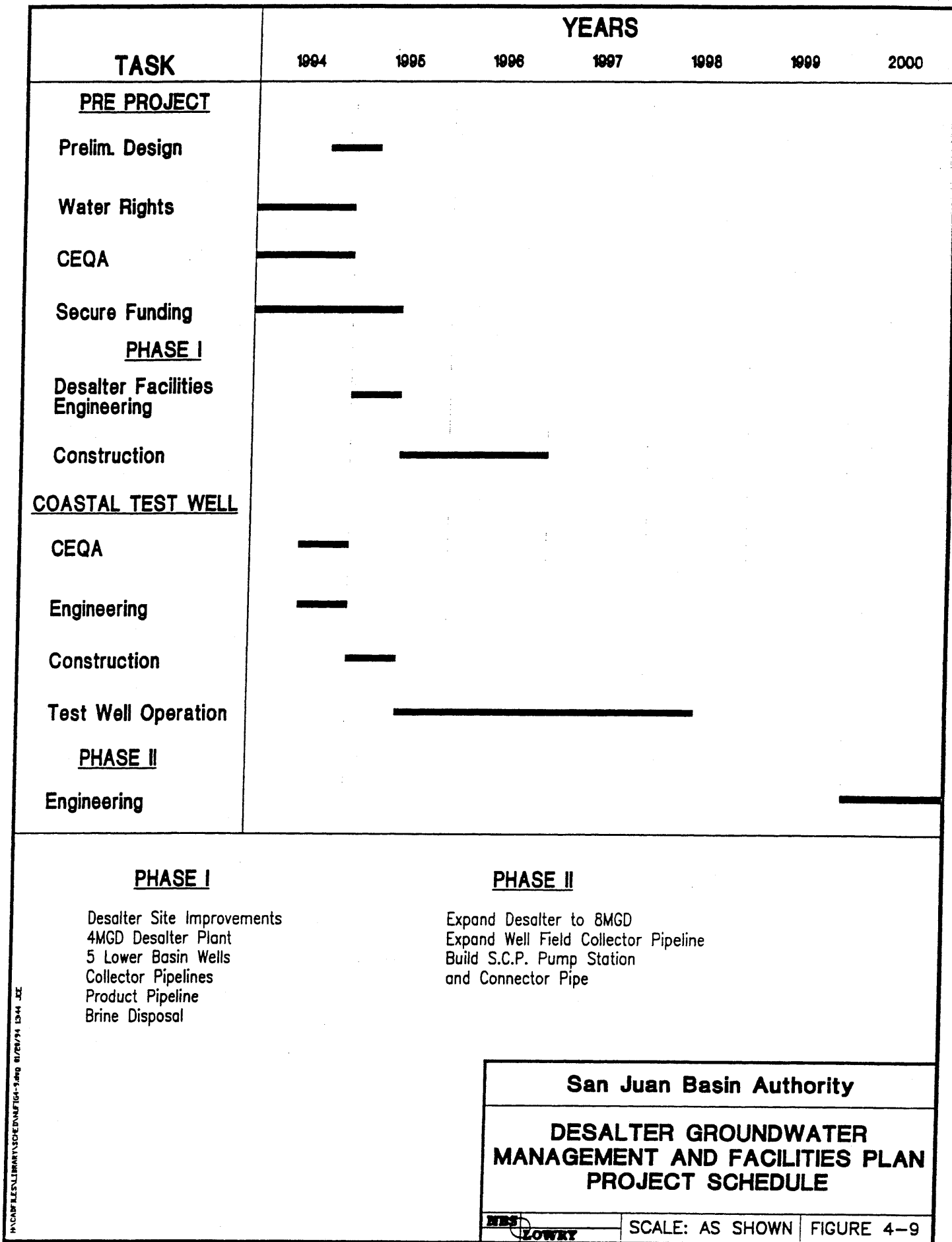


TABLE 4-3

SIMULATED SAN JUAN BASIN
HYDROLOGICAL COMPONENTS FOR PHASE I OPERATION
(ACRE-FEET)

| Year | Percolation of Precipitation | Artificial Recharge | Percolation of Applied Water | Streambed Percolation | Subsurface Inflow | Total Input | Rising Water | Pumpage | Phreatophyte Extraction | Ocean Outflow | Total Output | Net Input |
|------|------------------------------------|------------------------|------------------------------------|--------------------------|----------------------|----------------|-----------------|---------|----------------------------|------------------|-----------------|--------------|
| 1 | 1295 | | 934 | 2234 | 2459 | 6922 | 2284 | 7844 | 417 | -345 | 10200 | -3278 |
| 2 | 1816 | | 934 | 4482 | 2862 | 10094 | 799 | 7844 | 417 | 145 | 9205 | 889 |
| 3 | 459 | | 934 | 1809 | 3009 | 6211 | 461 | 7844 | 417 | 48 | 8770 | -2559 |
| 4 | 942 | | 934 | 2118 | 3108 | 7102 | 256 | 7844 | 417 | -42 | 8475 | -1373 |
| 5 | 1715 | | 934 | 3781 | 3137 | 9567 | 359 | 7844 | 417 | 119 | 8739 | 828 |
| 6 | 729 | | 934 | 1990 | 3162 | 6815 | 180 | 10644 | 417 | -641 | 10600 | -3785 |
| 7 | 833 | | 934 | 2074 | 3207 | 7048 | 106 | 10644 | 417 | -1232 | 9935 | -2887 |
| 8 | 1047 | | 934 | 2235 | 3209 | 7425 | 89 | 10644 | 417 | -1507 | 9643 | -2218 |
| 9 | 645 | | 934 | 1932 | 3240 | 6751 | 58 | 7844 | 417 | -1157 | 7162 | -411 |
| 10 | 597 | 825 | 934 | 1908 | 3258 | 7522 | 28 | 7844 | 417 | -292 | 7997 | -475 |
| 11 | 983 | 825 | 934 | 2177 | 3280 | 8199 | 22 | 7844 | 417 | -32 | 8251 | -52 |
| 12 | 1000 | 825 | 934 | 2186 | 3279 | 8224 | 16 | 7844 | 417 | 105 | 8382 | -158 |
| 13 | 1295 | 825 | 934 | 2375 | 3269 | 8698 | 26 | 7844 | 417 | 200 | 8487 | 211 |
| 14 | 1816 | 825 | 934 | 4575 | 3235 | 11385 | 225 | 7844 | 417 | 328 | 8814 | 2571 |
| 15 | 459 | 825 | 934 | 1862 | 3237 | 7317 | 114 | 7844 | 417 | 312 | 8687 | -1370 |
| 16 | 942 | 825 | 934 | 2147 | 3280 | 8128 | 61 | 7844 | 417 | 265 | 8587 | -459 |
| 17 | 1715 | 825 | 934 | 3801 | 3263 | 10538 | 207 | 7844 | 417 | 345 | 8813 | 1725 |
| 18 | 729 | | 934 | 1993 | 3254 | 6910 | 41 | 10644 | 417 | -814 | 10288 | -3378 |
| 19 | 833 | | 934 | 2066 | 3275 | 7108 | 11 | 10644 | 417 | -1421 | 9651 | -2543 |
| 20 | 1047 | | 934 | 2221 | 3263 | 7465 | 8 | 10332 | 417 | -1690 | 9067 | -1602 |
| 21 | 645 | 2200 | 934 | 1921 | 3284 | 8984 | 134 | 7844 | 417 | -66 | 8329 | 655 |
| 22 | 597 | 2200 | 934 | 1907 | 3292 | 8930 | 286 | 7844 | 417 | 143 | 8690 | 240 |
| 23 | 983 | 2200 | 934 | 2194 | 3307 | 9618 | 397 | 7844 | 417 | 221 | 8879 | 739 |
| 24 | 1000 | | 934 | 2212 | 3302 | 7448 | 0 | 7812 | 417 | -479 | 7750 | -302 |
| Mean | 1005 | 550 | 934 | 2425 | 3186 | 8100 | 257 | 8529 | 417 | -312 | 8891 | -791 |

As can be seen, the basin was slightly overdrafted and there was a small net seawater inflow to the basin. Seawater intrusion primarily occurs during the two years of increased pumping. As can be seen in Table 4-3, during years of normal pumping (current pumping plus 2,200 acre-feet per year) there is a net outflow of groundwater to the ocean. Moreover, during years where seawater intrudes, it is limited. Increased TDS concentrations advance only a short distance into the basin along the coast (see Appendix A nodal concentrations at Node No. 113).

Table 4-4 shows comparisons of simulated water quality for reclamation and no reclamation in the tributary areas based upon the quantity inputs and outputs shown in Table 4-3 and estimated water quality boundary conditions previously described (Table 4-2). Simulated water levels and groundwater TDS concentrations at selected nodes are included in Appendix A.

As can be seen in Table 4-4 and comparing the with and without reclamation scenarios, there is no statistical difference in groundwater quality between both cases. Simulated historic no project TDS is included for comparison. In the upper reaches of the basin there is a slight increase in TDS, primarily because of future estimated increases in return flows from landscape irrigation. Phase I project pumping will increase groundwater TDS due to pumping in Zones 6 and 7 to minimize subsurface outflow to the ocean. Water quality in the upper and middle basin areas is improved by simulated artificial recharge.

Simulated water levels for a Phase I project, Appendix A, suggest there will be little impact compared to historic conditions in the Upper and Middle San Juan Basins. At the confluence of the Lower Trabuco and Lower San Juan Basins (Zone 5), simulated water levels for a Phase I project suggest a regional drawdown of about 50 feet during each of the three years of drought pumping. Otherwise, water levels are unaffected by the Phase I additional pumpage of 2,200 acre-feet per year. In the upper portion of the Lower Trabuco Basin, near the confluence of the Oso and Trabuco Creeks, simulated water levels vary cyclically due to winter recharge and summer pumpage by about 30 feet. Water levels are, however, not affected by the Phase I project because new pumping occurs well to the south of this area. Near the coast in Zones 7 and 8, simulated water levels due to Phase I operation do not vary much from historical conditions.

Phase II

Final plans for Phase II would be developed in Phase I after experience is gained in implementing and operating the facilities as previously outlined. Phase II would as a minimum have the following objectives:

- 1) Increase sustained yield by at least 5,000 acre-feet per year by inducing seawater intrusion.
- 2) Increase desalting capacity to 8 mgd to provide additional drought and emergency water.
- 3) Tie desalter product water into the South County Pipeline to provide increased operational flexibility.
- 4) Expand use of the San Juan Basin for seasonal storage and pumpage.

TABLE 4-4
SIMULATED GROUNDWATER TDS IN THE SAN JUAN BASIN
FOR A PHASE I PROJECT
(mg/l)

| Zone* | Historic No Project | | | Without Reclamation | | | With Reclamation | | |
|-------|---------------------|---------|---------|---------------------|---------|---------|------------------|---------|---------|
| | Maximum | Minimum | Average | Maximum | Minimum | Average | Maximum | Minimum | Average |
| 1 | 550 | 420 | 480 | 650 | 450 | 515 | 650 | 450 | 515 |
| 2 | 980 | 705 | 810 | 1075 | 875 | 1020 | 1145 | 915 | 1085 |
| 3 | 665 | 425 | 535 | 480 | 400 | 440 | 515 | 415 | 470 |
| 4 | 990 | 585 | 785 | 590 | 395 | 460 | 610 | 405 | 480 |
| 5 | 1080 | 1005 | 1040 | 2600 | 690 | 1130 | 2605 | 490 | 1100 |
| 6 | 1245 | 870 | 1055 | 1305 | 720 | 1050 | 1305 | 720 | 1050 |
| 7 | 1585 | 1490 | 1544 | 3800 | 1100 | 2450 | 3800 | 1200 | 2500 |

* See Figure 3-1 for zone locations. TDS values are representative for each zone.

5) Incorporate reclamation and reuse into the San Juan Basin management plan.

Tentative Phase II facilities are depicted in Figure 4-7. To provide about 12,500 acre-feet per year of groundwater to the desalter facility, a total of about 12 wells would be required. Some of these wells could be dual-purpose extraction-injection wells. Also shown in Figure 4-7 are potential basin recharge sites.

Similar to the hypothetical simulations conducted for Phase I operation, simulations were conducted for Phase II operation for both reclamation and no reclamation in tributary areas. Historical annual pumping, Table 2-3, was increased by 5,000 acre-feet per year, and for two three-year drought periods pumping was increased by 10,000 acre-feet per year followed by four years of recharge at 7,500 acre-feet per year. The lumped basin inputs and outputs for this simulation are shown in Table 4-5. This table represents both future reclamation scenarios. Appendix A includes simulated water levels and TDS concentrations at selected nodes.

As can be seen in Table 4-5, the basin is slightly overdrafted. There is a substantial induced seawater inflow to the basin. Overdraft could be minimized by cutting down on rising water outflow by locating more wells along rising water areas of the San Juan Creek. While some initial efforts were made to strategically locate new wells, optimization of their location was not undertaken, being left to the subsequent design phases. It will also be noticed in Table 4-5 that drought year pumpage can not be sustained with the assumed well configuration. The reason for this is that simulated pumping was restricted because wells were pumped to bedrock in some cases.

Table 4-6 shows simulated TDS levels for various zones of the basin. TDS levels in mid-zones are improved due to simulated recharge, while near the coast TDS levels are considerably increased by simulated pumping in coastal zones. There is little statistical difference between simulated reclamation and no reclamation scenarios.

Simulated water levels, Appendix A, for a Phase II project are similar to those described for a Phase I project in the Upper San Juan Basin and the upper reaches of the Lower Trabuco Basin. There is little change of historic conditions. Most of the simulated increased pumpage is in the lower basin's Zones 4, 5, 7 and 8 (Figure 3-1). During normal years of simulated increased pumpage, there is little impact on groundwater levels. However, during each of the two simulated droughts, years of substantially increased pumpage, water level drawdowns of almost 100 feet were experienced in these areas.

TABLE 4-5

**SIMULATED SAN JUAN BASIN
HYDROLOGICAL COMPONENTS FOR PHASE II OPERATION
(ACRE-FEET)**

| Year | Percolation of Precipitation | Artificial Recharge | Percolation of Applied Water | Streambed Percolation | Subsurface Inflow | Total Input | Rising Water | Pumpage | Phreatophyte Extraction | Ocean Outflow | Total Output | Net Input |
|------|------------------------------------|------------------------|------------------------------------|--------------------------|----------------------|----------------|-----------------|---------|----------------------------|------------------|-----------------|--------------|
| 1 | 1295 | | 934 | 2233 | 1966 | 6428 | 2454 | 10644 | 417 | -1407 | 12108 | -5680 |
| 2 | 1816 | | 934 | 4473 | 2454 | 9677 | 793 | 10644 | 417 | -1477 | 10377 | -700 |
| 3 | 459 | | 934 | 1779 | 2623 | 5805 | 488 | 10644 | 417 | -1701 | 9848 | -4043 |
| 4 | 942 | | 934 | 2089 | 2730 | 6695 | 380 | 10644 | 417 | -1910 | 9531 | -2836 |
| 5 | 1715 | | 934 | 3750 | 2769 | 9168 | 450 | 10644 | 417 | -1879 | 9632 | -464 |
| 6 | 729 | | 934 | 1954 | 2797 | 6414 | 350 | 15644 | 417 | -3062 | 13349 | -6935 |
| 7 | 833 | | 934 | 2039 | 2840 | 6646 | 299 | 14710 | 417 | -3642 | 11784 | -5138 |
| 8 | 1047 | | 934 | 2202 | 2839 | 7022 | 280 | 13829 | 417 | -3705 | 10821 | -3799 |
| 9 | 645 | 7500 | 934 | 1899 | 2857 | 13835 | 262 | 10371 | 417 | -2910 | 8140 | 5695 |
| 10 | 597 | 7500 | 934 | 1888 | 2848 | 13767 | 531 | 10644 | 417 | -2247 | 9345 | 4422 |
| 11 | 983 | 7500 | 934 | 2236 | 2836 | 14489 | 1946 | 10644 | 417 | -1660 | 11347 | 3142 |
| 12 | 1000 | 7500 | 934 | 2350 | 2796 | 14580 | 2469 | 10644 | 417 | -1442 | 12088 | 2492 |
| 13 | 1295 | | 934 | 2606 | 2781 | 7616 | 254 | 10644 | 417 | -1525 | 9790 | -2174 |
| 14 | 1816 | | 934 | 4785 | 2776 | 10311 | 325 | 10644 | 417 | -1508 | 9878 | 433 |
| 15 | 459 | | 934 | 2055 | 2799 | 6247 | 263 | 10644 | 417 | -1759 | 9565 | -3318 |
| 16 | 942 | | 934 | 2324 | 2857 | 7057 | 228 | 10644 | 417 | -1981 | 9308 | -2251 |
| 17 | 1715 | | 934 | 3961 | 2856 | 9466 | 293 | 10644 | 417 | -1953 | 9401 | 65 |
| 18 | 729 | | 934 | 2138 | 2856 | 6657 | 251 | 15644 | 417 | -3108 | 13204 | -6547 |
| 19 | 833 | | 934 | 2202 | 2879 | 6848 | 216 | 14591 | 417 | -3647 | 11577 | -4729 |
| 20 | 1047 | | 934 | 2348 | 2869 | 7198 | 212 | 13680 | 417 | -3705 | 10604 | -3406 |
| 21 | 645 | 7500 | 934 | 2030 | 2881 | 13990 | 196 | 10368 | 417 | -2913 | 8068 | 5922 |
| 22 | 597 | 7500 | 934 | 1997 | 2869 | 13897 | 458 | 10644 | 417 | -2256 | 9263 | 4634 |
| 23 | 983 | 7500 | 934 | 2319 | 2855 | 14591 | 1896 | 10644 | 417 | -1659 | 11298 | 3293 |
| 24 | 1000 | 7500 | 934 | 2421 | 2813 | 14668 | 2447 | 10644 | 417 | -1438 | 12070 | 2598 |
| Mean | 1005 | 2500 | 934 | 2503 | 2769 | 9711 | 739 | 11631 | 417 | -2271 | 10516 | -805 |

TABLE 4-6

**SIMULATED GROUNDWATER TDS IN THE SAN JUAN BASIN
FOR A PHASE II PROJECT
(mg/l)**

| Zone* | Historic No Project | | | Without Reclamation | | | With Reclamation | | |
|-------|---------------------|---------|---------|---------------------|---------|---------|------------------|---------|---------|
| | Maximum | Minimum | Average | Maximum | Minimum | Average | Maximum | Minimum | Average |
| 1 | 550 | 420 | 480 | 650 | 450 | 515 | 650 | 450 | 515 |
| 2 | 980 | 705 | 810 | 1075 | 875 | 1020 | 1145 | 915 | 1085 |
| 3 | 665 | 425 | 535 | 480 | 400 | 440 | 515 | 415 | 470 |
| 4 | 990 | 585 | 785 | 590 | 395 | 460 | 610 | 405 | 480 |
| 5 | 1080 | 1005 | 1040 | 3200 | 450 | 1290 | 3205 | 450 | 1290 |
| 6 | 1245 | 870 | 1055 | 1280 | 610 | 940 | 1280 | 610 | 940 |
| 7 | 1585 | 1490 | 1544 | 17950 | 7050 | 11520 | 17950 | 7055 | 11525 |

* See Figure 3-1 for zone locations. TDS values are representative for each zone.

HYDROLOGICAL IMPACTS OF THE PROPOSED PROJECT ON STREAMFLOWS

Both of the main stream channels, the San Juan Creek and the Trabuco Creek channels, that traverse the main basin have riparian phreatophyte vegetation along them. Rising water in the San Juan Creek and the riparian vegetation probably support a variety of bird and animal species that are indigenous to the general area. Additionally, the vegetation provides a visual ambiance that is enjoyed by the numerous equestrian, bikers, and other visitors to the trails along the San Juan Creek. The question of hydrological impacts on this ecosystem by the proposed project is addressed in this section.

This is basically a groundwater management project and, consequently, impacts on the ground surface will be minimal. There are no management plans for the Upper San Juan Basin and therefore the proposed project will have no hydrological effects in this area.

Historically, rising water occurred along several reaches of the San Juan Creek, and in years of above normal groundwater storage, there was streamflow in the San Juan Creek through many reaches. This streamflow and high groundwater tables provided the water source for the riparian vegetation seen today. Although it is desirable from a water conservation standpoint to minimize rising water outflow, it is probable that in the future, stream baseflows will increase with or without the proposed project, the reason being the increased return flow to the main basin streams resulting from irrigation with imported water in the tributary areas that are being urbanized. Today, both the Trabuco and San Juan Creeks have a year-round flow in them.

Hydrological impacts of the proposed Phase I and II projects will probably increase rising water somewhat as is shown in Tables 4-3 and 4-5. Simulated average annual rising water for Phase I and Phase II is, respectively, 257 and 739 acre-feet per year and occurs in the San Juan Creek. There will be a non-project related change in the TDS of baseflows in the future. Trabuco Creek baseflow will improve, and San Juan Creek will slightly degrade because of the tributary area return flows.

Manipulation of the water table is a major part of the proposed management of the basin and, during drought years, water levels will be drawn down, particularly in the area of the basin where Trabuco Creek joins the San Juan Creek and downstream. Drawdowns for a short two- or three-year period of 100 feet or so may be achieved. Such drawdowns are not expected to have any hydrologic impacts on the stream systems because they will, for the reason stated above, have an adequate baseflow. Secondly, severe drawdowns will generally be of relatively short durations of three or less years. Assuming no baseflows, riparian vegetation would respond by lack of growth during such periods but would eventually respond as water levels returned to normal.

In conclusion, the proposed project will probably slightly improve streamflow conditions by maintaining and somewhat increasing baseflows. Riparian vegetation and the associated animal and bird species will not be impacted by hydrological modification in the ecosystem caused by this project.

CHAPTER 5

CONCEPTUAL FACILITIES TO MANAGE THE SAN JUAN BASIN

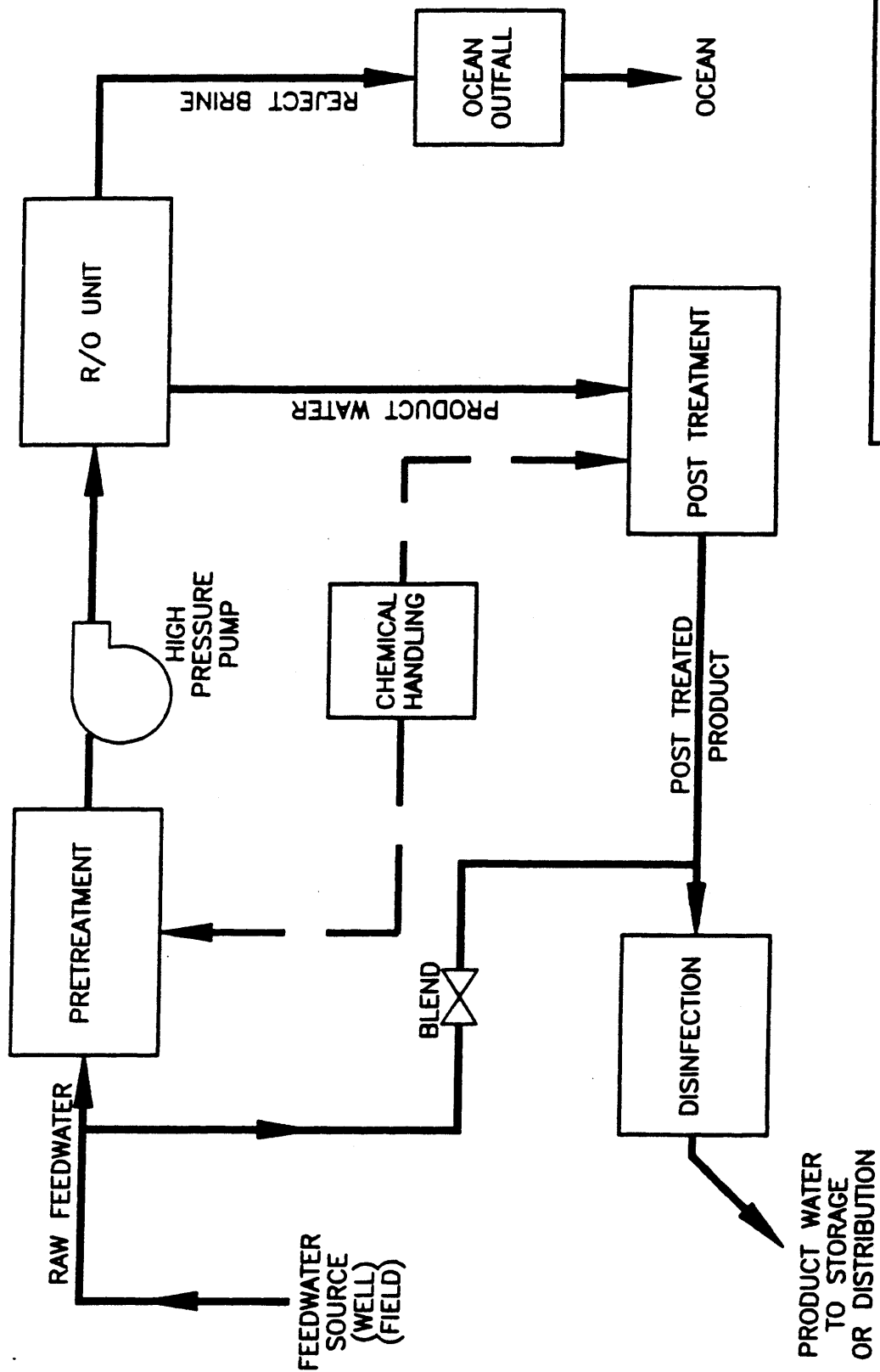
The ultimate project facilities to manage and operate the basin include wells, pipelines, artificial groundwater recharge basins, and an 8 mgd desalting water treatment plant. These facilities will have a maximum capacity to pump and treat 12,500 acre-feet per year for operation during extreme drought conditions where stored water within the basin is to be extracted. The average year extraction will be about 5,000 acre-feet per year. The facilities will include up to 12 wells to deliver water to the desalter plant. Product water from the desalter plant will be distributed into the Capistrano Valley Water District water delivery system at two points. By delivering water into CVWD's system at these points, CVWD can deliver water into all their pressure zones. It is expected that the average year project yield will be totally used by CVWD. However, by connecting at these points and with the addition of a booster pumping station, project water can be delivered into the South County Pipeline and/or Eastern Transmission Main for water distribution to other SJBA agencies. The proposed facilities are shown in Figure 4-7.

DESALTING TREATMENT PLANT

The desalting treatment plant will provide adequate water treatment to reduce salinity to a value acceptable for potable water use. Of particular concern will be the removal of iron and manganese, as well as total dissolved solids. The desalting plant will be designed to produce a total dissolved solid level of 500 mg/l. However, it will be possible to adjust this range up or down depending upon the desired finished water quality. In other words, it may be desirable to operate with slightly higher TDS to match existing imported water quality and reduce operating costs of the desalting plant.

Figure 5-1 schematically identifies the process train of the desalting plant. Inflow water will be split into two streams. One stream will be used for blending at the end of the treatment train; the second stream will be processed through the desalting plant. The blending stream will require pretreatment in the form of iron and manganese removal. The second stream will require pretreatment which may consist of iron and manganese removal, pH adjustment, and cartridge filtration in order to remove suspended matter that could plug the reverse osmosis membranes. Water will then pass through the reverse osmosis membrane racks, then through post-treatment for recarbonation and pH adjustment. The plant water will then be blended to adjust the TDS. Post-treatment of the final plant stream will also consist of disinfection through chlorination. A 1,000,000-gallon reservoir is proposed to be located on-site to provide a forebay to a pumping station to deliver water into the CVWD system and at times of emergency into the Eastern Transmission Main or South County Pipeline.

The plant will be designed with flexibility in mind, with water quality ranging from 1,500 mg/l to 7,000 mg/l. It is estimated that the maximum treated project water yield will be approximately 10,500 acre-feet per year for operation during a three-year drought period. At other times it is estimated that the plant would produce approximately 3,500 acre-feet per year.



| | |
|--------------------------|-----------------|
| San Juan Basin Authority | |
| DESALTER PROCESS DIAGRAM | |
| NBS LOWRY | SCALE: AS SHOWN |
| FIGURE 5-1 | |

Appendix B contains the siting study that identifies potential desalter sites. The Forster site is the most desirable site for the project's desalting plant. Figure 5-2 presents a conceptual site layout for the desalting plant. Approximately 3.5 acres are required for the desalting treatment plant. Approximately 1.5 acres of the proposed site are currently owned by the CVWD. The remaining 2 acres must be obtained from the Forster family.

DISTRIBUTION

CVWD should be able to use project water most of the time; however, the proposed project includes facilities to deliver water to other SJBA agencies in times of emergency. An examination of CVWD projected demands indicates that they should be able to use all Phase I production and perhaps the majority of the final project production. However, it is proposed to provide connections to South County regional water transmission facilities in order to distribute water to other SJBA member agencies. These connections include a connection to the Eastern Transmission Main during Phase I and the South County Pipeline during Phase II. Figure 5-3 conceptually depicts regional project water distribution.

WELLS

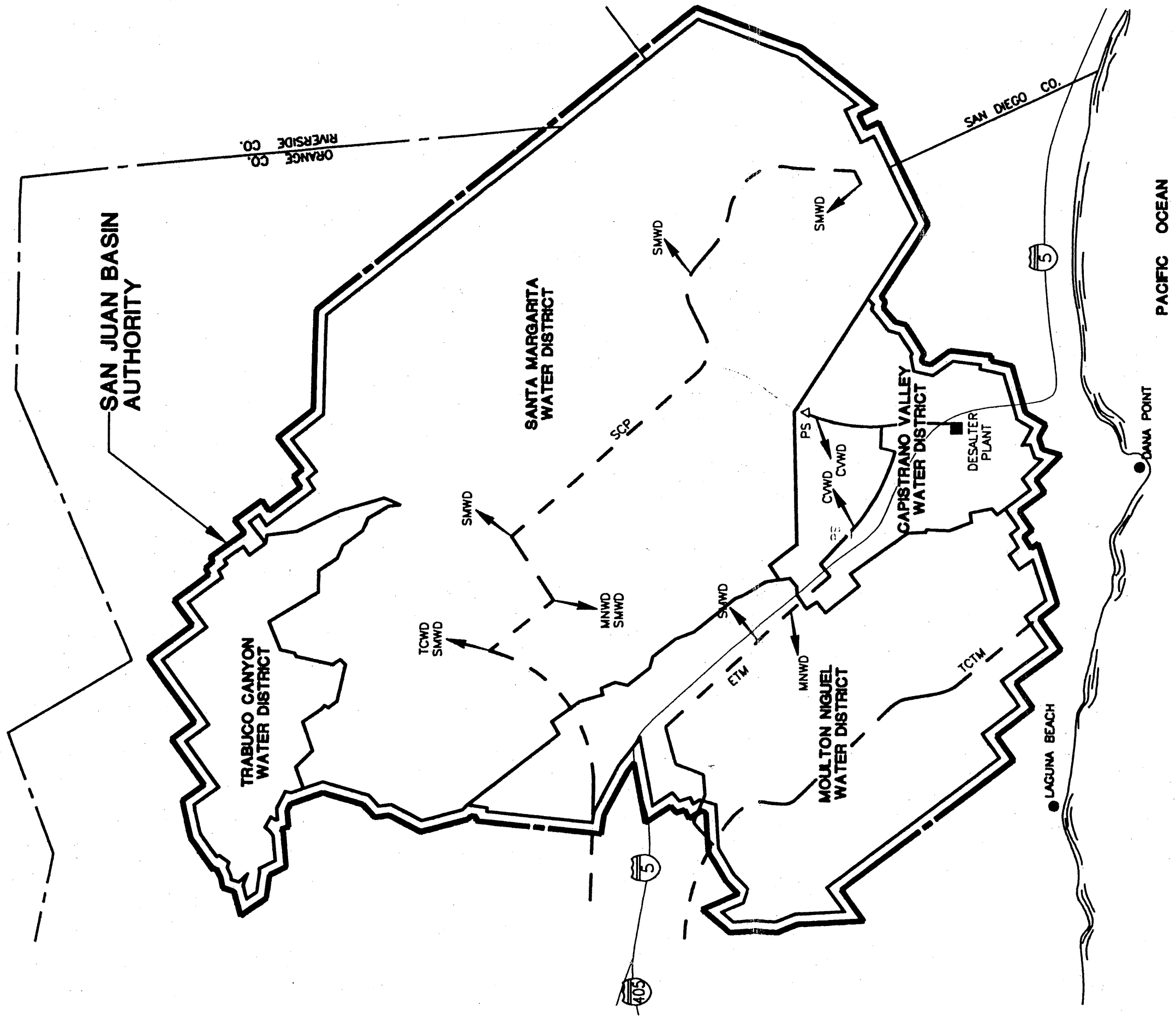
A number of wells would be required to provide feedwater to the desalting facility. The concept is that well water would be blended to provide the lowest feedwater mineral content.

To provide some redundancy and account for brine quantities and other losses associated with the desalting facility, a total well capacity of about 8,000 gpm will be required to provide feedwater to the desalting facility. Wells are anticipated to have a capacity of 1,000 gpm each in the southern end of the system and 450 gpm in the northern end of the system. Wells are spaced to account for an anticipated maximum radius of influence of about 1,500 feet for each well. Wells would discharge to a manifold pipe system with diameters ranging from 12 to 14 inches. Well pumps would be sized to provide sufficient head to move the pumped water to the desalting facility.

RECHARGE

Recharge may be by supply pumpers with "in-lieu" imported water, basins or wells, and possibly a combination of all may be required. The trade-offs between each method are the availability and cost of land for basins and the cost of well recharge. The proposed extraction wells can be designed for the dual purpose of pumping and recharge.

Figure 4-7 shows potential areas, primarily public land or land that is not readily developable where recharge basins may be located. It is anticipated that reasonable recharge rates may be achieved in these areas. Recharge basins are best operated in pairs; one is being used for ponding while a companion is drying and being renovated to restore recharge rates. Assuming a rather low average infiltration rate of 1 foot per day, 20 acres would be required to recharge a maximum of 7,500 acre-feet per year. Total land area required would be on the order of 25 acres.



EMERGENCY WATER DISTRIBUTION

| AGENCY | % PARTICIPATION | PHASE I AC FT/YR | PHASE I CFS | ULTIMATE AC FT/YR | ULTIMATE CFS |
|--------|-----------------|---------------------|----------------|----------------------|-----------------|
| SMWD | 57.5 | 2,473 | 3.8 | 6,038 | 9.2 |
| MNWD | 15.1 | 649 | 1.0 | 1,585 | 2.4 |
| CVWD | 22.0 | 946 | 1.4 | 2,310 | 3.5 |
| TCWD | 5.4 | 232 | 0.4 | 567 | 0.9 |
| TOTAL | 100.0 | 4,300 | 6.6 | 10,500 | 16.0 |

△ ESTIMATED BASED ON MWDCC SOUTH COUNTY STUDY (1985)

△ ESTIMATED BASED ON 330 DAYS PER YEAR OF OPERATION

LEGEND

- PHASE I
- PHASE II
- BY OTHERS

San Juan Basin Authority

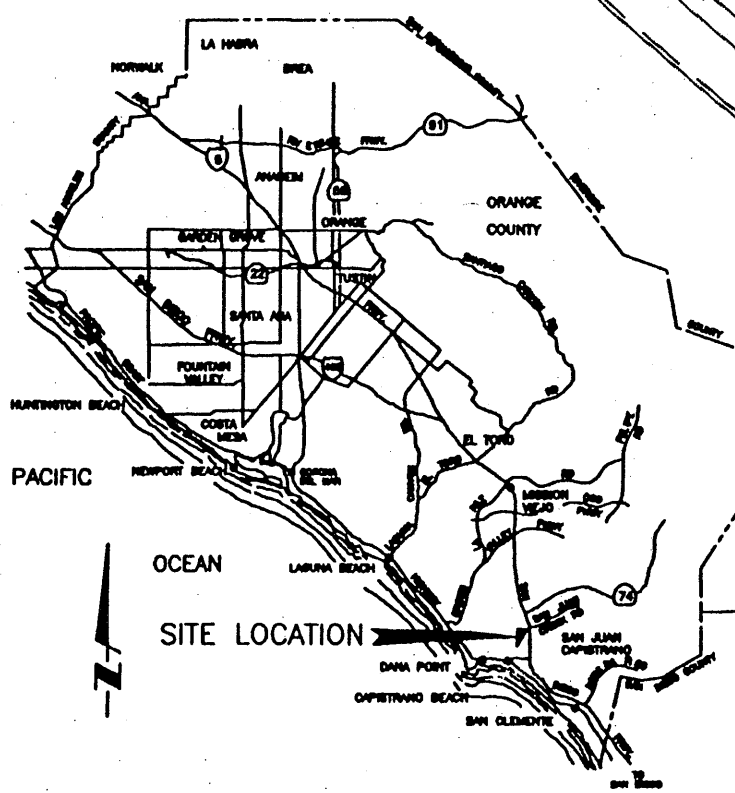
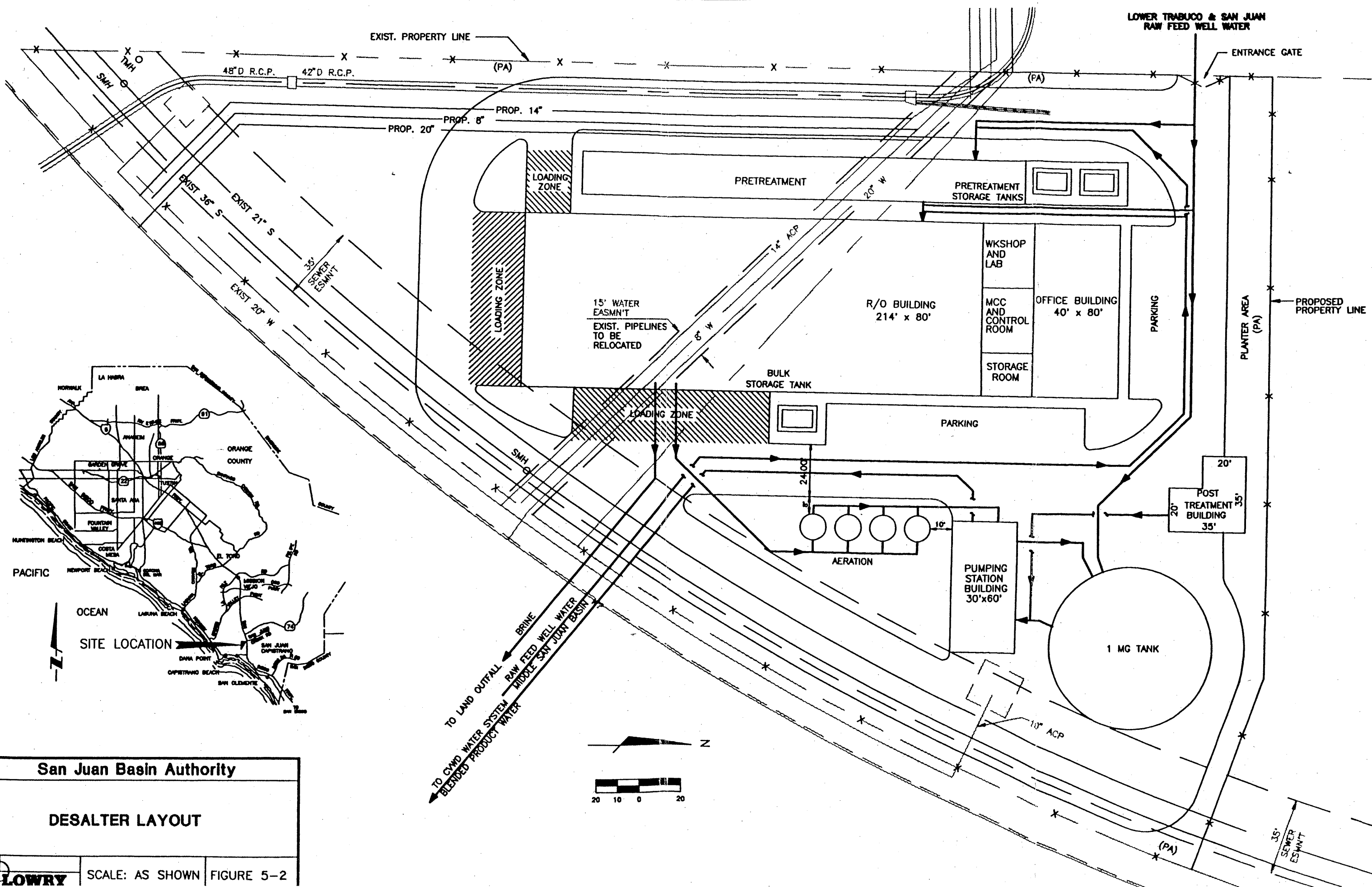
DESALTING PROJECT
EMERGENCY WATER DISTRIBUTION

NBS

LOWRY

SCALE: AS SHOWN

FIGURE 5-3



San Juan Basin Authority

DESALTER LAYOUT

NBS
LOWRY

SCALE: AS SHOWN FIGURE 5-2

The actual amount of land required will depend upon the recharge plan. For example, if 7,500 acre-feet per year is extracted for three years and it is desirable to recharge all the water in one year, i.e., 22,500 acre-feet, 75 acres of recharge facilities would be required.

Rather than simulate a recharge plan, it is suggested that the best strategy is to acquire as much reasonably priced land as possible and develop recharge facilities on this land. Depending on the amount of land acquired and the number of wells that may be constructed as dual-purpose wells, a recharge plan can be developed.

Simulations of the basin response to pumpage and recharge did not involve specification of the source of recharge water. It was assumed that it could be imported water purchased at incentive prices offered by MWDSC or reclaimed water, providing Department of Health Services approval can be obtained. There would be considerable advantage to using reclaimed water for recharge. Costs may be less and an additional source of water would be available to the basin.

CHAPTER 6

FUNDING ALTERNATIVES

A number of local, state and federal funding incentive, loan and grant programs are available to assist the SJBA in implementing water management alternatives within the San Juan Basin. Available means for funding and/or subsidizing all or part of any selected alternatives include, but are not limited to, the following:

| <u>Funding Mechanism</u> | <u>Funding Source</u> |
|--|--|
| 1. Groundwater Storage Recovery Program (GRP) | Metropolitan Water District of Southern California (MWDSC) |
| 2. Small Projects Program | United States Bureau of Reclamation |
| 3. Local Projects Program (LPP) | MWDSC |
| 4. Seasonal Storage Service Program (SSS) | MWDSC |
| 5. State Revolving Fund (SRF) Loan Program | State of California Water Resources Control Board (SWRCB) |
| 6. Water Reclamation Loan Program | SWRCB |
| 7. Water Quality Control Fund Loan Program | SWRCB |
| 8. Agricultural Drainage Management Loan Program | SWRCB |
| 9. Water Conservation Bond Law of 1988 | State of California Department of Water Resources (DWR) |
| 10. Special Legislation | State or Federal Government |
| 11. Agency (Revenue) Funding | Water Users |

The funding mechanisms appropriate for assisting the SJBA will be, in part, dependent on funds available. Funding assistance from the MWDSC, Department of Water Resources and Bureau of Reclamation, however, may form the cornerstone for the implementation of brackish groundwater desalting programs. Low interest loans, agency funding or other funding

mechanisms may also prove to be feasible. Available funding opportunities and mechanisms potentially applicable to the SJBA project are reviewed below.

MWDSC GROUNDWATER RECOVERY PROGRAM

The Groundwater Recovery Program (GRP), offered by MWDSC, is open to all technologies which develop and distribute new water sources for use within the MWDSC service area. MWDSC establishes the following eligibility criteria for the GRP:

1. Contaminated groundwater must be recovered.
2. The project must provide a non-interruptible supply.
3. Product water must be used within a MWDSC service area.
4. Project costs must exceed the non-interruptible rate for water.
5. Contaminated groundwater must be provided through the local safe yield of the area, recharged urban or agricultural runoff, or by groundwater replenishment by MWDSC.

The Groundwater Recovery Program provides project funding for costs of construction, design, operation and maintenance, replacement, pumping, treatment, groundwater replenishment and brine disposal. (Costs of distributing the water are not eligible for reimbursement under the GRP.) Although capital financing is not available, funding may be used towards paying off the capital cost.

Qualifying projects obtain financial benefit from the program by receiving a maximum contribution from MWDSC of \$250 per acre-foot of produced water. In addition, for each acre-foot of produced water, the implementing agency avoids the cost of having to purchase one acre-foot of MWDSC water. Qualifying criteria for GRP funding include the following:

1. Each project must be developed and operated by the member agency.
2. The member agency is responsible for developing markets for the produced water.
3. The project must be capable of operating for three years under drought conditions without the need for MWDSC replenishment.
4. The product water quality must meet applicable State of California standards.
5. The participating agency must obtain all applicable permits, and adhere to applicable regulations and laws, including the California Environmental Quality Act (CEQA).

The MWDSC has established a three-step review and contracting process for seeking GRP funding:

1. A project proposal is submitted from the MWDSC member agency to MWDSC's General Manager.
2. If the project meets the qualifying criteria, the project sponsor and MWDSC meet to negotiate a contract which defines the project, the rules governing payment, the role of the member agency, liability and other related matters.
3. Approval by the MWDSC Board is required before MWDSC is committed to participate in the project. Contracting principles for the program include the following:
 - ▶ The project will be constructed, owned and operated by the sponsoring agency.
 - ▶ MWDSC will guarantee to purchase the project's new water yield at the unit rate equal to the sum of MWDSC's applicable water rate plus MWDSC's GRP contribution of \$250 per acre-foot.
 - ▶ The new water yield will be sold to MWDSC's member agency at the applicable water rate for resale to the project sponsor (if the member agency is not the sponsor).
 - ▶ The net effective payment by MWDSC will be the GRP contribution.
 - ▶ All contracts will include a MWDSC member agency.

BUREAU OF RECLAMATION SMALL PROJECTS PROGRAM

The Small Projects Program is a potential federal assistance program for groundwater resource, reclaimed water reuse and quality control projects, with emphasis on agricultural, domestic and municipal water supply projects. The Small Projects Program is designed to encourage state and local participation in developing and managing groundwater aquifer systems.

Under the proposed program, the Secretary of Interior, acting through the Bureau of Reclamation, would provide federal loans and grants for projects which:

1. Maintain groundwater pumping levels and prevent long-term overdraft of aquifers.
2. Develop surface and groundwater conjunctive use facilities to conserve water for seasonal or long-term recovery that would otherwise be wasted.
3. Prevent groundwater contamination from toxic spills and pollution sources.
4. Clean up and treat contaminated groundwater.

5. Provide water supplies to agricultural, domestic and municipal water supply systems, including pumping, conveyance, distribution, storage and treatment facilities.
6. Promote and facilitate conservation through the use of reclaimed water.
7. Restore, create and enhance wetlands and other environmental resources.

Proposals for projects would be sent to the Secretary of Interior. Proposals must include a detailed report that provides the following information: plans, estimated costs and benefits, and financial and repayment terms as may be determined to be sufficient for evaluating the engineering, and financial and environmental feasibility of the proposal. If a project involves irrigation development, a statement assuring sustained production of irrigated agricultural crops must be submitted. A description of any water or soil characteristic would be required if toxic or hazardous irrigation return flows could result. Finally, a statement would be required that describes whether the organization already holds or can acquire land and water rights needed for the completed project.

MWDSC LOCAL PROJECTS PROGRAM

The Local Projects Program (LPP) is offered by the MWDSC. The program is open to all technologies which develop and distribute a new water source for use in MWDSC's service area. The program is based on the concept that the local development of water resources allows MWDSC to avoid costs for pumping imported water over the Tehachapi Mountains or developing alternate sources of supply water. The LPP passes on these avoided costs back to the agency developing the local water supply.

The program defines a "Local Project" as being a project under which a new local water supply is developed by a MWDSC member agency or subagency which currently receives water from MWDSC. The new water supply must be used within the MWDSC service area and must reduce MWDSC cost to convey, treat and distribute water. MWDSC establishes the following qualifying criteria for the program:

- ▶ Minimum Yield. Projects must deliver at least 100 acre-feet per year of new water within the MWDSC service area and replace firm water demands on the MWDSC system.
- ▶ Financial Assistance. Projects must require MWDSC financial assistance to be economically viable to the project sponsor.
- ▶ Policy Needs. Projects must be implementable under the MWDSC Enabling Act and any other pertinent legal requirements.
- ▶ Technical Development. Projects must have an approved "Facilities Plan" which presents the project layout, staging and cost. A marketing analysis must be completed for non-potable water projects.

- ▶ Regulatory Needs. Projects must demonstrate that public health and regulatory permits are obtainable.
- ▶ California Environmental Quality Act. Projects must comply with the provisions of the California Environmental Quality Act (CEQA) before the MWDSC Board of Directors can approve the project for inclusion in the LPP.

MWDSC can contribute to approved projects by providing (1) production incentives or (2) capital financing. Approved projects provide a production incentive of \$154 per acre-foot of produced water. The assistance, essentially a subsidy, comes in the form of a "buy-back" agreement between the MWDSC and the local agency. The "buy-back" agreement can extend for a period of up to 25 years. The LPP incentive is subject to review every three to five years by the MWDSC Board of Directors; the incentive may be increased or decreased at the discretion of the MWDSC Board.

While the MWDSC encourages the project sponsor to secure its own capital financing, they may provide capital financing under the revised Local Projects Program. If any agency is unable to secure financing for its project, MWDSC may consider providing a capital contribution equivalent to the estimated MWDSC annual contribution to the project. In such circumstances, MWDSC would own the yield from the project and the project sponsor must then guarantee that the project would produce a minimum amount of water each year.

The review and contracting process to seek MWDSC LPP funding is similar to the process to obtain funding through GRP.

MWDSC SEASONAL STORAGE SERVICE PROGRAM

The Seasonal Storage Service (SSS) incentive program is provided by the MWDSC. In general, under this program, a local water agency enters into a purchase and pricing contract with MWDSC which, in lieu of increasing its purchases of imported water during the high demand summer months, the local agency can purchase additional MWDSC water during the months of October through April. During the months of October through April, MWDSC generally has available unallocated water supply. To encourage the off-demand seasonal purchase of MWDSC imported water supply, MWDSC provides local agencies a purchase price reduction. To qualify for the water pricing incentives, the local agency must demonstrate that its purchases of MWDSC water will be reduced correspondingly during the months of May through September. If the terms of the contract are not met by the local agency, MWDSC may impose severe water pricing penalties.

STATE REVOLVING FUND PROGRAM

The State Revolving Fund Program (RFP) provides capital financing for wastewater treatment, agricultural drainage, nonpoint source, estuary enhancement, storm drainage and water reclamation projects. The RFP, administered by the State Water Resources Control Board, provides from \$150 to \$240 million each year.

The RFP offers loans for up to 20 years at an interest rate equal to one-half the rate for the most recent sale of state general obligation bonds. (The February 1992 interest rate was approximately 3.5 percent.) The loans are available for planning, design and construction of publicly owned wastewater treatment works projects, construction of storm drainage projects, implementation of nonpoint source correction projects, and development and implementation of estuary conservation and management plans. Loans through the program are limited to \$20 million per project.

Public wastewater agencies or organizations with authority to control nonpoint source pollution are eligible for the loans. Applications for loans under the RFP, however, often greatly exceed the available funds. As a result, the state establishes an annual priority list to direct available monies to the most worthy projects. To be placed on the priority list, applicants must receive a recommendation from the appropriate Regional Water Quality Control Board.

After completion and approval of facilities planning and design, applicants must submit a completed loan application package. Eligible projects must comply with environmental review requirements set forth in the California Environmental Quality Act (CEQA).

WATER RECLAMATION LOAN PROGRAM

The Water Reclamation Loan Program provides funds for projects which develop cost-effective water reclamation projects. The fund is administered by the State Water Resources Control Board, Office of Water Recycling. The program, established under the Clean Water Bonds Law of 1984, authorized up to \$25 million for loans to municipalities to assist in the design and construction of water reclamation projects. The Clean Water and Water Reclamation Bond Law of 1988 was established to provide aid for local public agencies not included in the 1984 Bonds Law.

Funding is currently limited to \$5 million maximum for each project at an interest rate equal to one-half the rate of the most recent sale of a state general obligation bond. (Currently this rate is approximately 3.5 percent.) Loan terms under the program must not exceed 20 years.

The Water Reclamation Loan Program provides funds for wastewater treatment facilities necessary to produce water for beneficial uses. Wastewater sources eligible are municipal wastewater, agricultural wastewater, polluted groundwaters or polluted surface waters. Storage and distribution systems for reclaimed water are also eligible. Water conservation projects are not funded under this program, but funding is available to projects that incorporate both reclamation and conservation features.

Eligibility requirements for the loan program include: (1) applicants must be a local public agency, (2) projects must be cost-effective compared to the development of new sources of water or alternative new fresh water supplies, and (3) project proponents must comply with requirements of the California Environmental Quality Act (CEQA). The review and contracting process for the Water Reclamation Loan Program involves the following:

1. Project proponent submits project application documents to the Office of Water Recycling. (Applications are available from the Office of Water Recycling.)

2. The State Board reviews the application and planning documents, and issues project concept approval, makes preliminary eligibility determination, and determines the availability of loan funds. (Projects are funded in the order in which the applications are received.)
3. The State Board approves the proposed project, and authorizes a loan commitment.
4. The project proponent submits project construction drawings and specifications, cost estimates, construction financing plan, revenue program, final user contracts, final CEQA documentation, and a plan for the use of remaining project capacity.
5. The submittal is reviewed by State Board staff, and approval for construction is issued.
6. The State Board issues the loan for execution with the participating agency.

WATER QUALITY CONTROL FUND LOAN PROGRAM

The Water Quality Control Fund Loan Program (WQCFLP), administered by the State Water Resources Control Board, provides loans for wastewater treatment facilities. The program provides loans at terms not to exceed 25 years at an interest rate equal to one-half the average rate paid by the state on general obligation bonds. (This rate is currently approximately 3.5 percent.)

The Water Quality Control Fund Loan Program provides loans for wastewater treatment feasibility studies, water reclamation feasibility studies, and construction of wastewater treatment facilities. Eligibility requirements for the program include the following:

1. The applicant must hold a local election in which a simple majority vote approves the loan.
2. The applicant must demonstrate that revenue or general obligation bonds cannot be sold.
3. The applicant must demonstrate financial hardship and proof that local funding is not available.

Loan applications for the Water Quality Control Fund Loan Program may be obtained through the State Board, Division of Clean Water Programs. The completed application must contain documents that demonstrate financial hardship, lack of local share, and local election results. Approximately six months are needed to process the loan application.

AGRICULTURAL DRAINAGE WATER MANAGEMENT LOAN PROGRAM

The Agricultural Drainage Water Management Loan Program, offered by the State Water Resources Control Board, provides assistance for feasibility studies, design and construction of agricultural drainage water management projects.

Loans are restricted to cities, counties, special districts, joint powers authorities, or other political subdivisions of the state involved with water management. Eligible projects must be demonstrated to remove, reduce or mitigate pollution from agricultural drainage. Projects funded through this mechanism have included evaporation ponds and deep well injection, selenium removal projects, cleanup projects for groundwater contaminated by agricultural practices, agricultural drainage management projects, and agro/forestry projects and feasibility studies.

The Agricultural Drainage Water Management Loan Program was originally funded at \$75 million, and as of February 1992, the program funds were exhausted. Thus, unless additional funding is provided to the program, such agricultural drainage loans would not represent a feasible means of funding the SJBA project.

WATER CONSERVATION BOND LAW OF 1988

The Water Conservation Bond Law of 1988 (Proposition 82) provides \$20 million for loans to local agencies to assist in the planning and construction of projects that develop new local water supplies. The program is administered by the Department of Water Resources (DWR) Bond Financing and Administration Office. The interest rate charged for the loans is equal to the interest rate that the state pays on the general obligation bonds sold to finance the program.

The program limits the amount loaned to \$5 million dollars for the construction of water supply facilities. To be eligible for construction loans, the engineering, hydrologic, environmental, economic, and financial viability of the project must be demonstrated in a feasibility study. Costs of such feasibility studies can be covered under the loan program. The program limits the amount loaned for feasibility studies to \$500,000 per study. (Since the feasibility study is required to demonstrate the viability of project construction, separate loans are needed from the DWR for funding the feasibility study and project construction.)

The DWR provides application information both for the water supply construction loans and for water supply feasibility studies. The applications require organizational, financial and legal information, project description, feasibility study work plan, engineering and hydrologic feasibility information, economics justification analysis, state-wide interest, critical need demonstration, and environmental documentation.

For approved projects, the DWR executes a loan contract with the implementing agency. Work on project feasibility studies or construction projects, however, may begin prior to the execution of a contract with DWR. In order to receive reimbursement, however, the participating agency must contact the Bond Financing and Administration Office prior to incurring the costs.

SPECIAL LEGISLATION

If economic and other effects associated with the Southern California water shortage become sizable, the SJBA and other local agencies may wish to consider lobbying for legislative assistance at the state or federal level. If state or federal legislators can be convinced of the merits of a SJBA water resources project, it may prove possible to obtain special legislation that could

provide capital funding, low interest loans, subsidies, or other financial incentives for the use of produced potable or non-potable water.

AGENCY FUNDS

The SJBA or member agencies involved in the implementation of groundwater management projects could fund capital improvements out of existing reserves or bonding capacity. Under this funding approach, the capital expenditures could be recovered through the generation of revenues received from the sale of the produced potable or non-potable water. Certificates of participation could be one of these funding mechanisms. The MWDOC has formed the Water Facilities Corporation which is available to MWDOC agencies and could provide a good vehicle for project funding.

FUNDING RECOMMENDATIONS

Financial assistance could include contributions to the capital cost of the projects needed to implement a management plan, or incentives for the pricing of the product water resulting from the implementation of the plan.

The MWDSC incentive financing programs are largely the result of the desire of the MWDSC to increase the production of local water supply sources to reduce the total dependence on the import systems of the MWDSC. The Groundwater Recovery Program encourages the development and use of local groundwater. This program basically provides a subsidy of \$250 per acre-foot to bring down the cost of producing groundwater to a cost that is more equal to the cost of purchasing water from MWDSC. This program is proposed to be widely used by many agencies in the MWDSC service area that have the ability to produce groundwater, and is an important cornerstone funding mechanism for the SJBA.

The Authority has been working closely with the staff of the MWDSC and the MWDOC to ensure that the Authority's plan conforms to the criteria of the Groundwater Recovery Program. The pricing of MWDSC water is a key element in the financial incentive programs, and it will be necessary to work even more closely with the staff of MWDSC in the future as the MWDSC water pricing policies are modified because of ever-changing conditions in the water supply field.

The MWDSC Seasonal Storage Service Program encourages the expansion of local groundwater storage for reducing the peaking requirements on the MWDSC aqueduct systems. The Authority can also participate in this program that will mutually benefit both the Authority and MWDSC. This program will most likely evolve with new criteria as conditions change with new water pricing policies.

The other state and federal financial assistance programs are principally loan programs that provide low-interest funds for the construction of treatment plants and pipelines. The potential funds available from these programs vary greatly from year to year, depending on the level of activity by agencies applying for funding assistance, and the amount of funding provided by state bond issues, and/or the amount of federal funds authorized by Congress and the Office of Management and Budget. The State Water Resources Control Board each year prepares a

priority ranking of projects based on recommendations from the local regional water quality control boards. The new priority list will be issued in October 1994. Funds from the federal level will be dependent upon the reenactment of the Clean Water Act (S1114 Baucus-Chafee) now being considered by Congress. State matching funds will be dependent upon a proposed bond issue for the fall of 1994. The Water Conservation Bond Law of 1988 holds the best promise for a low interest loan for up to \$5 million for the proposed project. This program is administered by the State Department of Water Resources, and that agency has already performed a preliminary review of the Authority's project. Further discussions and loan application documents need to be filed to obtain final approval.

The funding programs provided by the U.S. Bureau of Reclamation are significantly different than those previously discussed. Since the early 1900's, the Bureau has constructed many large water development projects in the western states, and as an ancillary activity, has offered financial assistance to construct "small projects" to assist in the development of irrigation water to increase agricultural production. The Small Projects Program has evolved over the years to also include grants for flood control, recreation, environmental enhancement, and also loans for municipal water supply projects. However, it was also necessary to always include agricultural irrigation as a component of a proposed project. More recently, the mission of the Bureau has been redefined to focus more on "total water resources management," rather than the construction of large-scale water development projects. The recent enactment of Title 16 of PL 102-75 essentially eliminates the requirement of agricultural irrigation as an essential component of an eligible project. The law promotes new uses of reclaimed water and naturally impaired ground and surface waters. The construction of desalting plants, wells and related pipeline facilities fits very well with the goal of the new mission of the Bureau.

A number of projects similar to the Authority's proposed project are now being funded under the provisions of PL 102-75, including a desalting plant for the West Basin and Central Basin in Los Angeles County. Many other projects throughout the United States are included for funding of 25 percent to 50 percent of the capital cost of the projects. Some of the projects that are heavily oriented toward research and development are funded at the 50 percent level. Projects that are principally production-oriented are funded at the 25 percent level.

The proposed Basin Authority projects fit the criteria of PL 102-75 and should qualify for federal assistance at least at the 25 percent level. However, it will be necessary to obtain support of local Congressmen to get authorization for funding, and to provide testimony before the appropriate committees in Congress.

The recommended funding strategy is summarized as follows:

- ▶ Maximize funding opportunities from MWDSC, including Local Projects, GRP and Seasonal Storage. Try and obtain capital participation through the Local Projects Program.
- ▶ Obtain the maximum grant funds from USBR PL 102-75 program, estimated at 25 percent of project cost.

- ▶ Obtain low interest loan from DWR or SWRCB programs, i.e., Water Conservation Bond Law of 1988 - \$5 million maximum.
- ▶ Fund remaining capital cost with local funding mechanisms.
- ▶ Initiate funding strategy concurrent with CEQA process.

CHAPTER 7

ECONOMIC FEASIBILITY

FACILITIES ESTIMATED COSTS

Preliminary cost estimates were prepared for the facilities proposed and described in Chapters 4 and 5. The total capital cost to develop both Phase I and Phase II facilities is about \$33,812,000 (see Appendix C). Only Phase I costs will be presented and economically evaluated.

Table 7-1 presents estimated capital costs for a Phase I project involving a 4 mgd desalter, five wells, pump station, pipes and other facilities. Table 7-2 presents operation and maintenance costs for annual net potable water yields of 1,800 acre-feet per year and assumed drought year yields of 3,600 acre-feet per year. All costs are based on December 1993 dollars.

PROJECT ECONOMIC FEASIBILITY AND BENEFITS

A 25-year life is assumed although it is probable that a Phase II project will be implemented about five years after the Phase I project comes on line. Before a Phase II project is approved, an economic feasibility study will need to be developed based on the experiences of operating Phase I.

The project has two economic aspects to evaluate: its economic viability as a water supply project and, added to that, its economic viability as a water supply and storage project. A project that produces 1,800 acre-feet per year, pumping during the five summer months with no added extractions during drought or emergencies, was assumed to be the water supply case. The water storage case is a project producing as above; however, also producing an additional 1,800 acre-feet during droughts for a total of 3,600 acre-feet per year, with the additional extractions coming from storage and a modest amount of seawater intrusion.

In order to evaluate the storage case, it was necessary to develop a hypothetical annual sequence of groundwater extractions and desalter yield. This sequence includes annual potable project yields of 1,800 acre-feet with occasional drought year project yields of 3,600 acre-feet per year for an assumed maximum three-year period.

Drought recurrence was estimated by considering the 111-year (1876-1987) Lake O'Neil annual precipitation data. During this period the average annual precipitation was 13.34 inches and the standard deviation was about 7.87 inches. If drought is defined as a year where precipitation was less than the mean minus one-half a standard deviation, 10.60 inches, there were 39 years of drought during the 111-year period. Approximately 35 percent of the time is a drought condition. This means that in a future hypothetical 25-year period, approximately 8.75 years would be a drought condition. To be conservative, it was assumed that there would be two three-year drought periods to evaluate economic feasibility.

TABLE 7-1

**PHASE I
CONJUNCTIVE USE FACILITIES
PRELIMINARY COST ESTIMATE**

CAPITAL COST

| DESCRIPTION | COST \$ |
|--|-------------------|
| Well - Complete with Pump (4 Wells @ \$250,000 ea & 1 Rehab @ \$40,000) | 1,040,000 |
| Land - 4 sites | 30,000 |
| Coastal Monitoring Wells (3 Wells @ \$20,000 ea) | 60,000 |
| Desalter Plant | |
| 4.0 mgd R.O. Plant Complete (\$1.30 per gal/day) | 5,200,000 |
| Desalter Building (10,000 sq.ft. @ \$20/sq. ft.) concrete tilt-up. Includes plumbing, electrical, foundation, etc. | 200,000 |
| Site Improv. Paving, Grading, Storm Drain, Water & Sewer, etc. | 500,000 |
| Access Road - Asphalt Paving (\$3/sq. ft.) | 100,000 |
| Land - 3.2 acres | 512,000 |
| Pump Stations - (Valves & Piping Included) | |
| @ Desalter Plant 3-200 HP @ \$150,000 ea. | 450,000 |
| Building (40 ft. x 20 ft. @ \$150/sq. ft.) | 120,000 |
| Brine Line - (1,000 LF - 12 in. @ \$60/LF) - Installed | 60,000 |
| Product Line - (13,500 LF - 24 in. @ \$140/LF) - Installed | 1,890,000 |
| Raw Water, Well Collection Pipelines - Installed | |
| Middle San Juan N/A | |
| Trabuco Creek N/A | |
| Lower San Juan (7,000 LF - 18 in. @ \$90/LF & 1,500 LF - 10 in. @ \$50/LF) | 705,000 |
| Desalter Collector (1,500 LF - 24 in. @ \$120) | 180,000 |
| Brine Capacity Charge | 615,000 |
| Subtotal | 11,662,000 |
| Engineering, Surveying, Etc. -15% | 1,749,000 |
| Contingencies - 15% | 1,749,000 |
| TOTAL CAPITAL COSTS | 15,160,000 |

TABLE 7-2

**PHASE I
CONJUNCTIVE USE FACILITIES
PRELIMINARY COST ESTIMATE**

OPERATION AND MAINTENANCE COSTS

| POTABLE WATER PLANT PRODUCTION ANNUAL COST | 1,800 AF/YR \$/YR (4) | 3,600 AF/YR \$/YR (5) |
|---|----------------------------------|----------------------------------|
| DESALTER | | |
| Fixed O&M (1) | 98,000 | 98,000 |
| Variable O&M (2) | | |
| Chemicals, Labor, Replacement | 225,000 | 491,000 |
| Energy | 132,000 | 590,000 |
| PUMP STATION | | |
| @ Desalter | | |
| Fixed @ 2.5 % Capital | 6,000 | 6,000 |
| Variable O&M | | |
| Labor, Spare Parts, Service | 0 | 5,500 |
| Energy | 117,000 | 234,000 |
| WELLS | | |
| Fixed O&M @ 2.5 % Capital | 14,200 | 14,200 |
| Variable O&M | | |
| Labor, Spare Parts, Service | 0 | 17,100 |
| Energy (3) | 57,000 | 130,000 |
| OCEAN OUTFALL | | |
| Fixed O&M | 1,700 | 1,700 |
| Variable O&M | 0 | 2,300 |
| Total O&M Fixed | 119,900 | 119,900 |
| Total O&M Variable | 531,000 | 1,469,900 |
| Total O&M | 650,900 | 1,589,800 |
| Total O&M/AF | 362 | 442 |

NOTES AND ASSUMPTIONS

1. Includes labor and maintenance supply costs.
2. Includes chemical, energy, labor, maintenance supply, and membrane replacement costs.
3. Based on providing 45 psi delivery pressure at inlet to desalting plant.
4. Energy cost assumed to be \$0.11/KWH, and 150 days per year operation.
5. Energy cost assumed to be \$0.11/KWH, and 330 days per year operation.

Project economic feasibility is determined by comparing the cost of project water to the cost of MWDSC imported non-interruptible water delivered in South Orange County. MWDSC has made several projections of future water cost. Two MWDSC water cost scenarios were examined and are believed to "bracket" future imported water costs. Table 7-3 presents the project imported water costs used in this study.

There are numerous financial incentives and opportunities for financing Phase I, as discussed in Chapter 6. The financial analysis assumes the following financial incentives and opportunities:

- ▶ 25 percent grant from the USBR PL102-75 program.
- ▶ Low interest loan (3-1/2 percent) from DWR or SWRCB for \$5,000,000.
- ▶ Remaining capital funding through local funding mechanisms.
- ▶ Maximum participation in MWDSC Groundwater Recovery and Seasonal Storage Programs.

WATER SUPPLY CASE

Tables 7-4 and 7-5 present net project cost per acre-foot for the water supply case. Included are capital, operations and maintenance costs, and MWDSC incentives. Table 7-4 compares net project cost to imported water cost Scenario 1 (Table 7-3) and Table 7-5 to Scenario 2.

A benefits and cash flow analysis was developed to further assess economic feasibility. Tables 7-6 and 7-7 analyze the financial benefits or costs of the project as a whole and to each member agency. The analysis is based on CVWD using all produced water and buying other agencies' share at MWDOC water rates. The benefits (or costs) are summed to provide a cumulative cash flow. Under both imported water cost scenarios, the water supply case project pays for itself throughout its life with a significant cumulative cash flow.

Table 7-8 summarizes the total cash flow and present worth of the Phase I water supply case. As can be seen, there is a significant economic benefit from the project. The cash flow is summarized graphically in Figure 7-1.

WATER STORAGE CASE

Tables 7-9 and 7-10 present net project cost per acre-foot for the water storage case. Included are capital, operational and maintenance costs and MWDSC incentives. Table 7-9 compares net project cost to imported water cost, Scenario 1, and Table 7-10 to Scenario 2.

A benefits and cash flow analysis was developed to further assess economic feasibility. Tables 7-11 and 7-12 analyze the financial benefits or costs of the project as a whole and to each member agency. The benefits (or costs) are summed to provide a cumulative cash flow. The project with Scenario 2 imported water cost maintains a positive cumulative cash flow. With Scenario 1 imported water cost, the cumulative becomes negative by the end of the project study

TABLE 7-3
PROJECTED IMPORTED WATER COST
\$ PER ACRE FOOT

| Year | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Scenario 1 - With Constant Dollar Seasonal Differential | | | | | | | | | | | | | | |
| MWDSC Treated | 412 | 448 | 482 | 505 | 542 | 574 | 592 | 600 | 608 | 616 | 636 | 654 | 677 | 695 |
| MWDSC Seasonal | 280 | 316 | 350 | 373 | 410 | 442 | 460 | 468 | 476 | 484 | 503 | 522 | 545 | 563 |
| MWDOC | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 |
| SCPS & AMP | 56 | 58 | 59 | 61 | 62 | 64 | 65 | | | | | | | |
| Total MWDSC Treated | 472 | 510 | 546 | 570 | 609 | 642 | 662 | 605 | 613 | 621 | 641 | 659 | 683 | 701 |
| Total MWDSC Seasonal | 340 | 378 | 414 | 438 | 477 | 510 | 530 | 473 | 481 | 489 | 508 | 527 | 551 | 569 |
| Scenario 2 - With Constant Percentage Seasonal Differential | | | | | | | | | | | | | | |
| MWDSC Treated | 417 | 456 | 492 | 520 | 561 | 597 | 618 | 627 | 636 | 645 | 667 | 688 | 714 | 734 |
| MWDSC Seasonal | 275 | 301 | 325 | 343 | 370 | 394 | 408 | 414 | 420 | 426 | 440 | 454 | 471 | 484 |
| MWDOC | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 |
| SCPS & AMP | 56 | 58 | 59 | 61 | 62 | 64 | 65 | | | | | | | |
| Total MWDSC Treated | 477 | 518 | 556 | 585 | 628 | 665 | 688 | 632 | 641 | 650 | 672 | 693 | 720 | 740 |
| Total MWDSC Seasonal | 336 | 363 | 388 | 408 | 437 | 462 | 478 | 419 | 425 | 431 | 445 | 459 | 477 | 490 |

Notes and Assumptions:

1. Sources - MWDOC December 1993
2. The effective treated water rate includes fixed charges (connection maintenance, readiness-to-serve, one-half of new demand charge, treated, peaking) calculated for MWDSC as a whole.
3. The "effective" rate increases are based upon proportionate sales of water service.
4. Rates shown are based upon MWDSC sales and revenue projections, forecasts of treated, untreated and seasonal storage sales through 2001. Rates beyond year 2001 are based upon annual "effective" increase derived from revenue projections provided by MWDSC and proportioned on the basis of 64% non-interruptible and 34% seasonal sales.
5. Scenario 1 - The treated seasonal rate is assumed to remain at \$132 per acre foot less than the treated rate.
6. Scenario 2 - The treated seasonal rate is assumed to remain a constant 66% of the treated rate.
7. South County Pipeline Pump Station (SCPS) O & M and AMP surcharge included through year 2000.
8. SCPS and AMP costs inflated at the rate of 2.5 percent per year.

TABLE 7-3 Continued
PROJECTED IMPORTED WATER COST
\$ PER ACRE FOOT

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| Scenario 1 - With Constant Dollar Seasonal Differential | | | | | | | | | | | | | | |
| MWDSC Treated | 714 | 736 | 759 | 782 | 807 | 832 | 857 | 884 | 912 | 940 | 967 | 999 | 1,030 | 1,062 |
| MWDSC Seasonal | 582 | 604 | 627 | 650 | 675 | 700 | 725 | 752 | 780 | 808 | 835 | 867 | 894 | 922 |
| MWDOC | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 |
| SCPS & AMP | | | | | | | | | | | | | | |
| Total MWDSC Treated | 720 | 742 | 765 | 788 | 813 | 839 | 864 | 891 | 919 | 947 | 974 | 1,007 | 1,038 | 1,070 |
| Total MWDSC Seasonal | 588 | 610 | 633 | 656 | 681 | 707 | 732 | 759 | 787 | 815 | 842 | 875 | 902 | 930 |
| Scenario 2 - With Constant Percentage Seasonal Differential | | | | | | | | | | | | | | |
| MWDSC Treated | 755 | 780 | 806 | 832 | 860 | 888 | 917 | 947 | 979 | 1,010 | 1,041 | 1,077 | 1,115 | 1,154 |
| MWDSC Seasonal | 498 | 515 | 532 | 549 | 568 | 586 | 605 | 625 | 646 | 667 | 687 | 711 | 736 | 761 |
| MWDOC | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 |
| SCPS & AMP | | | | | | | | | | | | | | |
| Total MWDSC Treated | 761 | 786 | 812 | 838 | 866 | 895 | 924 | 954 | 986 | 1,017 | 1,048 | 1,085 | 1,122 | 1,162 |
| Total MWDSC Seasonal | 504 | 521 | 538 | 555 | 574 | 593 | 612 | 632 | 653 | 674 | 694 | 718 | 743 | 769 |

Notes and Assumptions:

1. Sources - MWDOC December 1993
2. The effective treated water rate includes fixed charges (connection maintenance, readiness-to-serve, one-half of new demand charge, treated, peaking) calculated for MWDSC as a whole.
3. The "effective" rate increases are based upon proportionate sales of water service.
4. Rates shown are based upon MWDSC sales and revenue projections, forecasts of treated, untreated and seasonal storage sales through 2001. Rates beyond year 2001 are based upon annual "effective" increase derived from revenue projections provided by MWDSC and proportioned on the basis of 64% non-interruptible and 34% seasonal sales.
5. Scenario 1 - The treated seasonal rate is assumed to remain at \$132 per acre foot less than the treated rate.
6. Scenario 2 - The treated seasonal rate is assumed to remain a constant 66% of the treated rate.
7. South County Pipeline Pump Station (SCPS) O & M and AMP surcharge included through year 2000.
8. SCPS and AMP costs inflated at the rate of 2.5 percent per year.

TABLE 7-4
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
NET COST ANALYSIS
\$ PER ACRE FOOT

| YEAR | 1995 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 |
|---|------|------|------|------|------|------|------|------|
| DESALTER PRODUCTION, af/yr (1) | 0 | 0 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| RECHARGE WATER/INLIEU, af/yr (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRODUCTION COST \$/af (3) | | | | | | | | |
| Capital (3A) | 0 | 0 | 469 | 469 | 469 | 469 | 469 | 469 |
| O & M | | | | | | | | |
| Fixed (3B) | 0 | 0 | 72 | 77 | 81 | 85 | 90 | 94 |
| Variable (3C) | 0 | 0 | 318 | 342 | 359 | 378 | 397 | 417 |
| Recharge/inlieu (4) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Misc. Well Displacement Water Cost (4a) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub Total | 0 | 0 | 859 | 889 | 910 | 932 | 956 | 980 |
| MWDSC GRP Benefit (5) | 0 | 0 | 250 | 227 | 250 | 250 | 250 | 250 |
| Sub Total | 0 | 0 | 609 | 662 | 660 | 682 | 706 | 730 |
| MWDSC SSS Benefit (6) | 0 | 0 | 66 | 66 | 66 | 66 | 67 | 66 |
| NET PROJECT WATER COST (7) | 0 | 0 | 543 | 596 | 594 | 616 | 639 | 664 |
| MWDSC Non Interruptible to So. Co. Agencies (8) | 510 | 546 | 570 | 662 | 613 | 641 | 683 | 720 |

NOTES:

- (1) Estimated desalter output: 1,800 ac. ft. per year from 2,200 ac. ft. per year well extraction during five summer months.
- (2) Estimated amount of recharge water or inlieu water purchased to replace pumped water from storage after drought operation. None required.
- (3) Estimated desalter production cost.
 - (3a) Annualized Capital cost facility cost of \$15,160,000 with 25% grant from USBR, \$5,000,000 low interest loan (3.5%) from DWR and remaining financed by local bonds (6%).
 - (3b) Fixed O & M costs include minimum labor, and maintenance supplies costs. Costs are inflated at 2.5% per year.
 - (3c) Variable O & M costs include energy, chemical, membrane replacement, maintenance and variable labor costs. Costs are inflated at 2.5% per year.
- (4) Cost of recharge/inlieu water or difference in cost of water supplied to pumpers "inlieu" of pumping. Based on pumper water cost of \$75 / ac. ft. (1993 \$) inflated at 2.5% / yr. and cost of MWDSC recharge water.
 - No recharge required.
 - (4a) Cost of purchasing replacement water for pumpers affected by high TDS during operation of project (per acre feet of project production at 150 ac. ft. / yr during impacted years) None required

TABLE 7-4 Continued
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
NET COST ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2012 | 2014 | 2016 | 2018 | 2020 | 2021 |
|---|------|------|------|------|------|------|------|
| DESALTER PRODUCTION, af/yr (1) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| RECHARGE WATER/INLIEU, af/yr (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRODUCTION COST \$/af (3) | | | | | | | |
| Capital (3A) | 469 | 469 | 469 | 469 | 469 | 469 | 169 |
| O & M | | | | | | | |
| Fixed (3B) | 96 | 101 | 109 | 115 | 118 | 120 | 127 |
| Variable (3C) | 427 | 449 | 472 | 495 | 521 | 534 | 547 |
| Recharge/inlieu (4) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Misc. Well Displacement Water Cost (4a) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub Total | 993 | 1020 | 1062 | 1077 | 1108 | 1123 | 1161 |
| MWDSC GRP Benefit (5) | 250 | 231 | 198 | 186 | 160 | 149 | 123 |
| Sub Total | 743 | 788 | 864 | 891 | 947 | 974 | 1038 |
| MWDSC SSS Benefit (6) | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| NET PROJECT WATER COST (7) | 677 | 722 | 798 | 825 | 881 | 908 | 972 |
| MWDSC Non Interruptible to So. Co. Agencies (8) | 742 | 788 | 839 | 891 | 947 | 974 | 1038 |
| | | | | | | | 1070 |

NOTES Continued:

(5) MWDSC GRP Benefit is a maximum of \$250 per ac. ft.

(6) MWDSC SSS Benefit is estimated at 50% project net groundwater production (1,800 ac. ft.) or 900 ac. ft. per year.
Benefit is the difference in MWDSC noninterruptible water cost minus MWDSC SSS water cost.
Example: Year 2000MWDSC Nonint:
MWDSC SSS:\$662/ac. ft.
\$530/ac. ft.Total cost differential: \$132/ac. ft. times 900 ac. ft. = \$118,800
Total project benefit: \$118,800 divided by 1,800 ac. ft. = \$66/ac. ft.

Difference (benefit):

(7) Net Project Cost is the total project cost per ac. ft.

(8) Estimated MWDSC noninterruptible treated and SSS water cost from Scenario 1 as provided by MWDSC December 1993.

TABLE 7-5 Continued
PHASE I DESALTER
WITH SCENARIO 2 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
NET COST ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2012 | 2014 | 2016 | 2018 | 2020 | 2021 |
|--|------|------|------|------|------|------|------|
| DESALTER PRODUCTION, af/yr (1) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| RECHARGE WATER/INLIEU, af/yr (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRODUCTION COST \$/af (3) | | | | | | | |
| Capital (3A) | 469 | 469 | 469 | 469 | 469 | 469 | 469 |
| O & M | | | | | | | |
| Fixed (3B) | 96 | 104 | 109 | 112 | 118 | 123 | 130 |
| Variable (3C) | 427 | 449 | 483 | 495 | 521 | 547 | 575 |
| Recharge/inlieu (4) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Misc. Well Displacement Water Cost (4a) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub Total | 993 | 1020 | 1062 | 1077 | 1108 | 1140 | 1161 |
| MWDSC GRP Benefit (5) | 207 | 181 | 138 | 123 | 90 | 55 | 38 |
| Sub Total | 786 | 838 | 924 | 954 | 1017 | 1085 | 1122 |
| MWDSC SSS Benefit (6) | 125 | 133 | 146 | 151 | 161 | 172 | 183 |
| NET PROJECT WATER COST (7) | 661 | 706 | 778 | 803 | 856 | 913 | 946 |
| MWDSC Non Interruptible to So. Co. Agencies (8) | 786 | 838 | 895 | 954 | 1017 | 1085 | 1162 |

NOTES Continued:

(5) MWDSC GRP Benefit is a maximum of \$250 per ac. ft.

(6) MWDSC SSS Benefit is estimated at 50% project net groundwater production (1,800 ac. ft.) or 900 ac. ft. per year.
Benefit is the difference in MWDSC noninterruptible water cost minus MWDSC SSS water cost.

Example: Year 2000

MWDSC Nonint:

MWDSC SSS:

Difference (Benefit):

(7) Net Project Cost is the total project cost per ac. ft.

(8) Estimated MWDSC noninterruptible treated and SSS water cost from Scenario 1 as provided by MWDSC December 1993.

\$668 /ac. ft.

\$478 /ac. ft.

\$190 /ac. ft.

Total cost differential: \$190/ac. ft. times 900ac. ft. = \$171,000

Total project benefit: \$171,000 divided by 1,800ac. ft. = \$95/ac. ft.

TABLE 7-6
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER COST
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 543 | 553 | 576 | 596 | 583 | 594 | 605 | 616 | 628 | 639 | 652 | 664 | 677 |
| MWDSC WATER COST, \$/AF | 570 | 609 | 642 | 662 | 605 | 613 | 621 | 641 | 659 | 683 | 701 | 720 | 742 |
| PROJECT COST, \$ (1) | | | | | | | | | | | | | |
| SMWD | 562,049 | 572,128 | 596,824 | 617,232 | 603,946 | 615,032 | 626,437 | 638,126 | 650,108 | 661,872 | 674,978 | 687,881 | 701,107 |
| MNWD | 147,040 | 149,677 | 156,138 | 161,477 | 157,990 | 160,901 | 163,885 | 166,943 | 170,077 | 173,155 | 176,584 | 179,959 | 183,420 |
| CVWD | 215,080 | 218,937 | 228,387 | 236,197 | 231,097 | 235,355 | 239,719 | 244,192 | 248,778 | 253,279 | 258,295 | 263,232 | 268,293 |
| TCWD | 52,935 | 53,885 | 56,211 | 58,133 | 56,877 | 57,925 | 59,000 | 60,100 | 61,229 | 62,337 | 63,571 | 64,787 | 66,032 |
| Total | 977,103 | 994,627 | 1,037,559 | 1,073,038 | 1,049,871 | 1,069,214 | 1,089,040 | 1,109,362 | 1,130,192 | 1,150,643 | 1,173,428 | 1,195,860 | 1,218,852 |
| SALE TO CVWD, \$ (2) | | | | | | | | | | | | | |
| SMWD | 590,304 | 630,300 | 665,160 | 685,568 | 626,283 | 634,692 | 643,105 | 663,945 | 682,718 | 706,671 | 725,451 | 745,270 | 768,199 |
| MNWD | 154,432 | 164,895 | 174,015 | 179,354 | 163,844 | 166,044 | 169,245 | 173,697 | 178,609 | 184,875 | 189,788 | 194,973 | 200,972 |
| CVWD | 225,892 | 241,197 | 254,538 | 262,347 | 239,660 | 242,878 | 246,097 | 254,073 | 261,256 | 270,423 | 277,609 | 285,193 | 293,967 |
| TCWD | 55,596 | 59,363 | 62,647 | 64,569 | 58,985 | 59,777 | 60,569 | 62,532 | 64,300 | 66,556 | 68,325 | 70,192 | 72,351 |
| Total | 1,026,225 | 1,095,756 | 1,156,359 | 1,191,838 | 1,088,773 | 1,103,392 | 1,118,017 | 1,154,247 | 1,186,883 | 1,228,525 | 1,261,173 | 1,295,628 | 1,335,488 |
| BENEFIT, \$ (3) | | | | | | | | | | | | | |
| SMWD | 28,256 | 58,171 | 68,336 | 68,336 | 22,377 | 19,660 | 16,668 | 25,819 | 32,610 | 44,799 | 50,473 | 57,388 | 67,091 |
| MNWD | 7,392 | 15,218 | 17,878 | 17,878 | 5,854 | 5,143 | 4,361 | 6,755 | 8,531 | 11,720 | 13,204 | 15,014 | 17,552 |
| CVWD | 10,813 | 22,260 | 26,150 | 26,150 | 8,563 | 7,523 | 6,378 | 9,880 | 12,479 | 17,143 | 19,314 | 21,961 | 25,674 |
| TCWD | 2,661 | 5,479 | 6,436 | 6,436 | 2,108 | 1,852 | 1,570 | 2,432 | 3,071 | 4,219 | 4,754 | 5,405 | 6,319 |
| Total | 49,122 | 101,129 | 118,800 | 118,800 | 38,902 | 34,178 | 28,977 | 44,885 | 56,691 | 77,882 | 87,745 | 99,768 | 116,636 |
| SUM OF BENEFIT CASH FLOW | 49,122 | 150,250 | 269,050 | 387,850 | 426,752 | 460,930 | 489,907 | 534,792 | 591,482 | 669,364 | 757,110 | 856,878 | 973,514 |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | % of tot |
|---------------------|----------|
| SMWD | 57.52% |
| MNWD | 15.05% |
| CVWD | 22.01% |
| TCWD | 5.42% |
| Total | 100.00% |

TABLE 7-6 Continued
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER COST
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 699 | 722 | 747 | 773 | 798 | 825 | 853 | 881 | 908 | 941 | 972 | 807 |
| MWDSC WATER COST, \$/AF | 765 | 788 | 813 | 839 | 864 | 891 | 919 | 947 | 974 | 1007 | 1038 | 1070 |
| PROJECT COST, \$ (1) | | | | | | | | | | | | |
| SMWD | 723,830 | 747,802 | 773,848 | 799,899 | 825,953 | 854,083 | 883,252 | 912,426 | 940,569 | 973,893 | 1,006,155 | 835,444 |
| MNWD | 189,364 | 195,636 | 202,450 | 209,265 | 216,081 | 223,440 | 231,071 | 238,703 | 246,066 | 254,784 | 263,224 | 218,564 |
| CVWD | 276,989 | 286,162 | 296,129 | 306,098 | 316,068 | 326,833 | 337,995 | 349,159 | 359,928 | 372,681 | 385,026 | 319,700 |
| TCWD | 68,172 | 70,430 | 72,883 | 75,337 | 77,791 | 80,440 | 83,187 | 85,935 | 88,585 | 91,724 | 94,762 | 78,684 |
| Total | 1,258,356 | 1,300,030 | 1,345,310 | 1,390,598 | 1,435,893 | 1,484,795 | 1,535,505 | 1,586,223 | 1,635,148 | 1,693,082 | 1,749,168 | 1,452,393 |
| SALE TO CVWD, \$ (2) | | | | | | | | | | | | |
| SMWD | 792,166 | 816,138 | 842,184 | 868,235 | 894,289 | 922,419 | 951,588 | 980,762 | 1,008,905 | 1,042,229 | 1,074,491 | 1,107,752 |
| MNWD | 207,242 | 213,513 | 220,327 | 227,142 | 233,959 | 241,318 | 248,949 | 256,581 | 263,944 | 272,662 | 281,102 | 289,804 |
| CVWD | 303,139 | 312,312 | 322,280 | 332,248 | 342,219 | 352,983 | 364,145 | 375,309 | 386,079 | 398,831 | 411,177 | 423,905 |
| TCWD | 74,608 | 76,866 | 79,319 | 81,773 | 84,227 | 86,876 | 89,623 | 92,371 | 95,021 | 98,160 | 101,198 | 104,331 |
| Total | 1,377,156 | 1,418,830 | 1,464,110 | 1,509,398 | 1,554,693 | 1,603,595 | 1,654,305 | 1,705,023 | 1,753,948 | 1,811,882 | 1,867,968 | 1,925,791 |
| BENEFIT, \$ (3) | | | | | | | | | | | | |
| SMWD | 68,336 | 68,336 | 68,336 | 68,336 | 68,336 | 68,336 | 68,336 | 68,336 | 68,336 | 68,336 | 68,336 | 272,308 |
| MNWD | 17,878 | 17,878 | 17,878 | 17,878 | 17,878 | 17,878 | 17,878 | 17,878 | 17,878 | 17,878 | 17,878 | 71,240 |
| CVWD | 26,150 | 26,150 | 26,150 | 26,150 | 26,150 | 26,150 | 26,150 | 26,150 | 26,150 | 26,150 | 26,150 | 104,204 |
| TCWD | 6,436 | 6,436 | 6,436 | 6,436 | 6,436 | 6,436 | 6,436 | 6,436 | 6,436 | 6,436 | 6,436 | 25,647 |
| Total | 118,800 | 118,800 | 118,800 | 118,800 | 118,800 | 118,800 | 118,800 | 118,800 | 118,800 | 118,800 | 118,800 | 473,398 |
| SUM OF BENEFIT CASH FLOW | 1,092,314 | 1,211,114 | 1,329,914 | 1,448,714 | 1,567,514 | 1,686,314 | 1,805,114 | 1,923,914 | 2,042,714 | 2,161,514 | 2,280,314 | 2,753,712 |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | % of tot |
|---------------------|----------------|
| SMWD | 57.52% |
| MNWD | 15.05% |
| CVWD | 22.01% |
| TCWD | 5.42% |
| Total | 100.00% |

TABLE 7-7
PHASE I DESALTER
WITH SCENARIO 2 MWDSC WATER COST
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 531 | 544 | 577 | 593 | 548 | 555 | 564 | 574 | 584 | 606 | 623 | 639 | 661 |
| MWDSC WATER COST, \$/AF | 585 | 628 | 665 | 688 | 632 | 641 | 650 | 672 | 693 | 720 | 740 | 761 | 786 |
| PROJECT COST, \$ (1) | | | | | | | | | | | | | |
| SMWD | 550,121 | 563,372 | 597,445 | 613,743 | 567,160 | 574,590 | 584,410 | 594,516 | 604,913 | 627,577 | 644,732 | 662,045 | 684,559 |
| MNWD | 143,919 | 147,386 | 156,300 | 160,564 | 148,377 | 150,321 | 152,890 | 155,534 | 158,254 | 164,183 | 168,671 | 173,200 | 179,090 |
| CVWD | 210,515 | 215,586 | 228,625 | 234,862 | 217,036 | 219,879 | 223,637 | 227,504 | 231,483 | 240,156 | 246,720 | 253,345 | 261,961 |
| TCWD | 51,812 | 53,060 | 56,269 | 57,804 | 53,417 | 54,116 | 55,041 | 55,993 | 56,972 | 59,107 | 60,723 | 62,353 | 64,474 |
| Total | 956,367 | 979,404 | 1,038,639 | 1,066,972 | 985,989 | 998,906 | 1,015,978 | 1,033,546 | 1,051,622 | 1,091,023 | 1,120,845 | 1,150,944 | 1,190,084 |
| SALE TO CVWD, \$ (2) | | | | | | | | | | | | | |
| SMWD | 605,835 | 649,972 | 688,974 | 712,489 | 654,238 | 663,683 | 673,131 | 696,042 | 717,921 | 744,981 | 765,831 | 787,771 | 813,756 |
| MNWD | 158,495 | 170,042 | 180,245 | 186,397 | 171,158 | 173,629 | 176,101 | 182,094 | 187,818 | 194,897 | 200,352 | 206,079 | 212,890 |
| CVWD | 231,836 | 248,725 | 263,650 | 272,649 | 250,358 | 253,972 | 257,588 | 266,355 | 274,728 | 285,083 | 293,062 | 301,438 | 311,401 |
| TCWD | 57,059 | 61,216 | 64,889 | 67,104 | 61,618 | 62,507 | 63,397 | 65,555 | 67,616 | 70,164 | 72,128 | 74,190 | 76,642 |
| Total | 1,053,225 | 1,129,956 | 1,197,759 | 1,238,638 | 1,137,373 | 1,153,792 | 1,170,217 | 1,210,047 | 1,248,083 | 1,295,125 | 1,331,373 | 1,369,428 | 1,414,688 |
| BENEFIT, \$ (3) | | | | | | | | | | | | | |
| SMWD | 55,714 | 86,640 | 91,529 | 98,746 | 87,079 | 89,094 | 88,721 | 101,527 | 113,008 | 117,403 | 121,100 | 125,676 | 129,197 |
| MNWD | 14,576 | 22,656 | 23,945 | 25,833 | 22,781 | 23,308 | 23,211 | 26,561 | 29,564 | 30,714 | 31,681 | 32,879 | 33,880 |
| CVWD | 21,320 | 33,139 | 35,025 | 37,787 | 33,323 | 34,094 | 33,951 | 38,851 | 43,245 | 44,927 | 46,341 | 48,093 | 49,440 |
| TCWD | 5,247 | 8,156 | 8,620 | 9,300 | 8,201 | 8,391 | 8,356 | 9,562 | 10,643 | 11,057 | 11,406 | 11,837 | 12,168 |
| Total | 96,858 | 150,552 | 159,120 | 171,666 | 151,384 | 154,886 | 154,239 | 176,501 | 196,461 | 204,102 | 210,528 | 218,484 | 224,604 |
| SUM OF BENEFIT CASH FLOW | 96,858 | 247,410 | 406,530 | 578,196 | 729,579 | 884,466 | 1,038,704 | 1,215,205 | 1,411,666 | 1,615,768 | 1,826,296 | 2,044,780 | 2,269,384 |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | % of tot |
|---------------------|----------|
| SMWD | 57.52% |
| MNWD | 15.05% |
| CVWD | 22.01% |
| TCWD | 5.42% |
| Total | 100.00% |

TABLE 7-7 Continued
PHASE I DESALTER
WITH SCENARIO 2 MWDSC WATER COST
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 684 | 706 | 729 | 753 | 778 | 803 | 830 | 856 | 882 | 913 | 946 | 690 |
| MWDSC WATER COST, \$/AF | 812 | 838 | 866 | 895 | 924 | 954 | 986 | 1017 | 1048 | 1085 | 1122 | 1162 |
| PROJECT COST, \$(1) | | | | | | | | | | | | |
| SMWD | 707,937 | 730,614 | 755,190 | 779,771 | 805,038 | 831,345 | 859,552 | 886,551 | 913,203 | 945,213 | 978,982 | 714,210 |
| MNWD | 185,206 | 191,139 | 197,568 | 203,999 | 210,409 | 217,492 | 224,871 | 231,934 | 238,907 | 247,281 | 256,116 | 186,847 |
| CVWD | 270,907 | 279,585 | 288,990 | 298,396 | 308,065 | 318,132 | 328,926 | 339,257 | 349,456 | 361,706 | 374,628 | 273,308 |
| TCWD | 66,675 | 68,811 | 71,126 | 73,441 | 75,821 | 78,298 | 80,955 | 83,498 | 86,008 | 89,023 | 92,203 | 67,266 |
| Total | 1,230,726 | 1,270,150 | 1,312,874 | 1,355,606 | 1,399,533 | 1,445,267 | 1,494,303 | 1,541,241 | 1,587,574 | 1,643,222 | 1,701,929 | 1,241,631 |
| SALE TO CVWD, \$(2) | | | | | | | | | | | | |
| SMWD | 840,830 | 867,908 | 897,060 | 926,217 | 956,413 | 987,649 | 1,020,959 | 1,053,239 | 1,085,524 | 1,122,990 | 1,162,216 | 1,202,813 |
| MNWD | 219,973 | 227,057 | 234,684 | 242,311 | 250,211 | 258,383 | 267,097 | 275,542 | 283,988 | 293,790 | 304,052 | 314,673 |
| CVWD | 321,761 | 332,123 | 343,279 | 354,436 | 365,991 | 377,945 | 390,692 | 403,044 | 415,399 | 429,736 | 444,746 | 460,282 |
| TCWD | 79,192 | 81,742 | 84,488 | 87,234 | 90,078 | 93,019 | 96,157 | 99,197 | 102,238 | 105,766 | 109,461 | 113,284 |
| Total | 1,461,756 | 1,508,830 | 1,559,510 | 1,610,198 | 1,662,693 | 1,716,995 | 1,774,905 | 1,831,023 | 1,887,148 | 1,952,282 | 2,020,475 | 2,091,052 |
| BENEFIT, \$(3) | | | | | | | | | | | | |
| SMWD | 132,893 | 137,293 | 141,870 | 146,446 | 151,375 | 156,303 | 161,408 | 166,688 | 172,321 | 177,777 | 183,234 | 488,603 |
| MNWD | 34,767 | 35,918 | 37,115 | 38,312 | 39,602 | 40,891 | 42,227 | 43,608 | 45,062 | 46,509 | 47,937 | 122,825 |
| CVWD | 50,854 | 52,538 | 54,289 | 56,041 | 57,927 | 59,813 | 61,766 | 63,787 | 65,942 | 68,030 | 70,118 | 186,974 |
| TCWD | 12,516 | 12,931 | 13,362 | 13,793 | 14,257 | 14,721 | 15,202 | 15,699 | 16,230 | 16,744 | 17,257 | 46,018 |
| Total | 231,030 | 238,680 | 246,636 | 254,592 | 263,160 | 271,728 | 280,602 | 289,782 | 299,574 | 309,060 | 318,546 | 849,420 |
| SUM OF BENEFIT CASH FLOW | 2,500,414 | 2,739,094 | 2,985,730 | 3,240,322 | 3,503,482 | 3,775,210 | 4,055,812 | 4,345,594 | 4,645,168 | 4,954,228 | 5,272,774 | 6,122,194 |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | % of tot |
|---------------------|----------|
| SMWD | 57.52% |
| MNWD | 15.05% |
| CVWD | 22.01% |
| TCWD | 5.42% |
| Total | 100.00% |

TABLE 7-8
PHASE I DESALTER
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
BENEFIT SUMMARY

| | SCENARIO 1 | SCENARIO 2 |
|---|--------------|--------------|
| CASH FLOW OF PROJECT | | |
| Total sum of annual project cost | \$32,135,293 | \$30,904,377 |
| Total cost of purchasing MWDSC water <u>without</u> project | 34,889,004 | 37,026,571 |
| Total savings in water cost with the project (benefit) | 2,753,712 | 6,122,194 |
| Benefit-to-cost ratio | 1.09 | 1.20 |
| | | |
| PRESENT WORTH | | |
| Total present worth of cash flow | 13,646,920 | 13,145,729 |
| Total present worth of cash flow to purchase MWDSC water <u>without</u> the project | 14,721,952 | 15,525,930 |
| Net present worth of project (benefit) | 1,075,032 | 2,380,201 |
| Benefit-to-cost ratio | 1.08 | 1.18 |

NOTES

1. Scenarios 1 and 2 as described on Table 7-3.
2. Values arrived from analysis of Tables 7-4, 7-5, 7-6 and 7-7.

FIGURE 7-1
PHASE 1 DESALTER
CONJUNCTIVE USE PROJECT AS WATER SUPPLY
SUM OF NET CASH FLOW

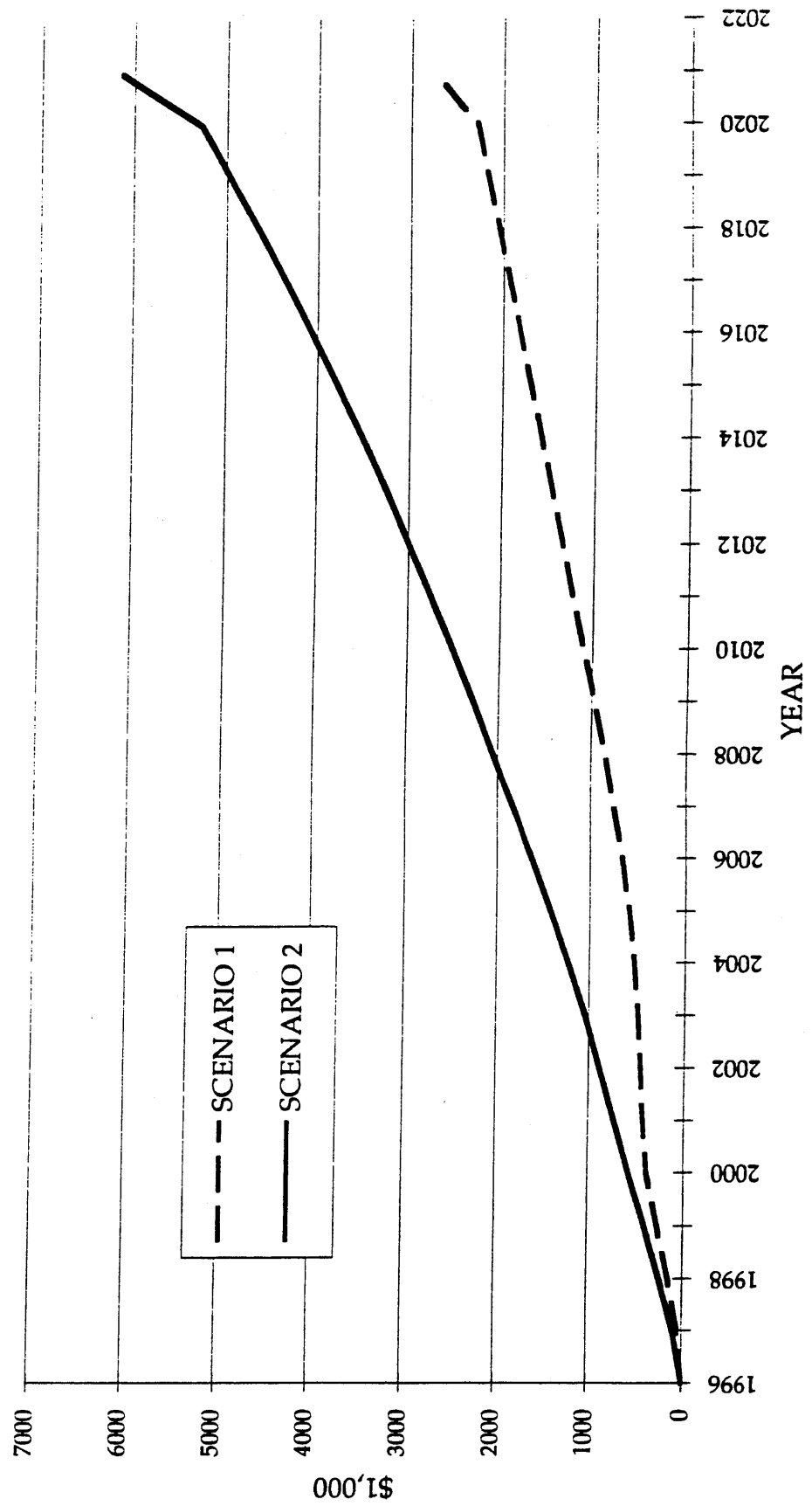


TABLE 7-9
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
NET COST ANALYSIS
\$ PER ACRE FOOT

| YEAR | 1995 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 |
|---|------|------|------|------|------|------|------|------|
| DESALTER PRODUCTION, af/yr (1) | 0 | 0 | 1800 | 1800 | 1800 | 3600 | 3600 | 1800 |
| RECHARGE WATER/INLIEU, af/yr (2) | 0 | 0 | 0 | 0 | 0 | 0 | 825 | 825 |
| PRODUCTION COST \$/af (3) | | | | | | | | |
| Capital (3A) | 0 | 0 | 469 | 469 | 469 | 235 | 235 | 469 |
| O & M | | | | | | | | |
| Fixed (3B) | 0 | 0 | 72 | 74 | 79 | 83 | 85 | 90 |
| Variable (3C) | 0 | 0 | 318 | 326 | 351 | 368 | 378 | 397 |
| Recharge/Inlieu (4) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 206 |
| Misc. Well Displacement Water Cost (4a) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub Total | 0 | 0 | 859 | 869 | 899 | 708 | 720 | 1181 |
| MWDSC GRP Benefit (5) | 0 | 0 | 250 | 250 | 250 | 87 | 79 | 250 |
| Sub Total | 0 | 0 | 609 | 619 | 649 | 621 | 641 | 931 |
| MWDSC SSS Benefit (6) | 0 | 0 | 66 | 66 | 66 | 33 | 33 | 66 |
| NET PROJECT WATER COST (7) | 0 | 0 | 543 | 553 | 583 | 588 | 608 | 865 |
| MWDSC Non Interruptible to So. Co. Agencies (8) | 510 | 546 | 570 | 609 | 605 | 621 | 641 | 701 |

3 NOTES:

- (1) Estimated desalter output: 1,800 ac. ft. per year from 2,200 ac. ft. per year well extraction during five summer months; 3,600 ac. ft. per year from 5,000 ac. ft. per year extraction during eleven months of operation during drought. (2,200 ac. ft. from natural yield 2,200 ac. ft. from storage and 600 ac. ft. from sea water).
- (2) Estimated amount of recharge water or inlieu water purchased to replace pumped water from storage after drought operation (2,200 ac. ft. times 3yrs divided by 8yrs = 825 ac. ft./yr.).
- (3) Estimated desalter production cost.
- (3a) Annualized Capital cost facility cost of \$15,160,000 with 25% grant from USBR, \$5,000,000 low interest loan (3.5%) from DWR and remaining financed by local bonds (6%).
- (3b) Fixed O & M costs include minimum labor, and maintenance supplies costs. Costs are inflated at 2.5% per year.
- (3c) Variable O & M costs include energy, chemical, membrane replacement, maintenance and variable labor costs. Costs are inflated at 2.5% per year.
- (4) Cost of recharge/inlieu water or difference in cost of water supplied to pumpers "Inlieu" of pumping. Based on pumper water cost of \$75/ ac. ft. (1993 \$) inflated at 2.5%/yr. and cost of MWDSC recharge water.
- Example: Year 2006 825 ac ft. recharge/inlieu water
- MWDSC projected recharge water cost: \$551/ ac. ft.
- Pumper projected water cost: \$101/ ac. ft.
- Difference: \$450/ ac. ft.
- (4a) Cost of purchasing replacement water for pumpers affected by high TDS during operation of project (per acre feet of project production at 150 ac. ft./yr during impact year)

TABLE 7-9 Continued
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
NET COST ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2012 | 2014 | 2016 | 2018 | 2020 | 2021 |
|---|------|------|------|------|------|------|------|
| DESALTER PRODUCTION, af/yr (1) | 1800 | 1800 | 1800 | 3600 | 1800 | 1800 | 1800 |
| RECHARGE WATER/INLIEU, af/yr (2) | 825 | 825 | 825 | 0 | 825 | 825 | 825 |
| PRODUCTION COST \$/af (3) | | | | | | | |
| Capital (3A) | 469 | 469 | 235 | 235 | 469 | 469 | 169 |
| O & M | | | | | | | |
| Fixed (3B) | 96 | 101 | 109 | 115 | 120 | 123 | 130 |
| Variable (3C) | 427 | 449 | 483 | 508 | 521 | 547 | 575 |
| Recharge/inlieu (4) | 230 | 248 | 0 | 0 | 313 | 337 | 359 |
| Misc. Well Displacement Water Cost (4a) | 0 | 0 | 0 | 0 | 68 | 72 | 75 |
| Sub Total | 1223 | 1245 | 827 | 857 | 1517 | 1549 | 1583 |
| MWDSC GRP Benefit (5) | 250 | 250 | 0 | 0 | 250 | 250 | 162 |
| Sub Total | 973 | 995 | 827 | 857 | 1267 | 1299 | 1070 |
| MWDSC SSS Benefit (6) | 66 | 66 | 33 | 33 | 66 | 66 | 66 |
| NET PROJECT WATER COST (7) | 907 | 929 | 794 | 824 | 1201 | 1233 | 1004 |
| MWDSC Non Interruptible to So. Co. Agencies (8) | 742 | 765 | 864 | 891 | 974 | 1007 | 1070 |

3 NOTES Continued:

(5) MWDSC GRP Benefit is a maximum of \$250 per ac. ft.

(6) MWDSC SSS Benefit is estimated at 50% project net groundwater production (1,800 ac. ft.) or 900 ac. ft. per year. Benefit is the difference in MWDSC noninterruptible water cost minus MWDSC SSS water cost.

Example: Year 2000

MWDSC Nonint:

MWDSC SSS:

Difference (Benefit):

(7) Net Project Cost is the total project cost per ac. ft.

(8) Estimated MWDSC noninterruptible treated and SSS water cost from Scenario 1 as provided by MWDSC December 1993.

Total cost differential: \$132/ac. ft. times 900 ac. ft. = \$118,800
 Total project benefit: \$118,800 divided by 1,800 ac. ft. = \$66/ac. ft.

TABLE 7-10
PHASE 1 DESALTER
WITH SCENARIO 2 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
NET COST ANALYSIS
\$ PER ACRE FOOT

| YEAR | 1995 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 |
|--|------|------|------|------|------|------|------|------|
| DESALTER PRODUCTION, af/yr (1) | 0 | 0 | 1800 | 1800 | 1800 | 3600 | 3600 | 1800 |
| RECHARGE WATER/INLIEU, af/yr (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 825 |
| PRODUCTION COST \$/af (3) | | | | | | | | |
| Capital (3A) | 0 | 0 | 469 | 469 | 469 | 235 | 235 | 469 |
| O & M | | | | | | | | |
| Fixed (3B) | 0 | 0 | 72 | 75 | 79 | 85 | 87 | 92 |
| Variable (3C) | 0 | 0 | 318 | 334 | 351 | 368 | 387 | 407 |
| Recharge/inlieu (4) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 177 |
| Misc. Well Displacement Water Cost (4a) | 0 | 0 | 0 | 0 | 0 | 23 | 25 | 0 |
| Sub Total | 0 | 0 | 859 | 879 | 899 | 709 | 722 | 1145 |
| MWDSC GRP Benefit (5) | 0 | 0 | 250 | 201 | 250 | 59 | 41 | 250 |
| Sub Total | 0 | 0 | 609 | 688 | 649 | 650 | 672 | 895 |
| MWDSC SSS Benefit (6) | 0 | 0 | 78 | 88 | 101 | 53 | 55 | 117 |
| NET PROJECT WATER COST (7) | 0 | 0 | 531 | 577 | 548 | 597 | 618 | 778 |
| MWDSC Non Interruptible to So. Co. Agencies (8) | 518 | 556 | 585 | 665 | 632 | 650 | 672 | 740 |

NOTES:

- (1) Estimated desalter output: 1,800 ac. ft. per year from 2,200 ac. ft. per year well extraction during five summer months; 3,600 ac. ft. per year from 5,000 ac. ft. per year extraction during eleven months of operation during drought. (2,200 ac. ft. from natural yield 2,200 ac. ft. from storage and 600 ac. ft. from seawater).
(2) Estimated amount of recharge water or inlieu water purchased to replace pumped water from storage after drought operation (2,200 ac. ft. times 3 yrs divided by 8 yrs = 825 ac. ft./yr.)
(3) Estimated desalter production cost.
(3a) Annualized Capital cost facility cost of \$15,160,000 with 25% grant from USBR, \$5,000,000 low interest loan (3.5%) from DWR and remaining financed by local bonds (6%).
(3b) Fixed O & M costs include energy, chemical, membrane replacement, maintenance and variable labor costs. Costs are inflated at 2.5% per year.
(3c) Variable O & M costs include energy, chemical, membrane replacement, maintenance and variable labor costs. Costs are inflated at 2.5% per year.
(4) Cost of recharge/inlieu water or difference in cost of water supplied to pump "inlieu" of pumping. Based on pump water cost of \$75 / ac. ft. (1993 \$) inflated at 2.5% / yr. and cost of MWDSC recharge water.
Example: Year 2006 825 ac. ft. recharge/inlieu water

MWDSC projected recharge water cost:

\$478 / ac. ft.

Pumper projected water cost:

\$101 / ac. ft.

Difference:

\$377 / ac. ft.

Total cost differential = 825 ac. ft. times \$177 / ac. ft. = \$146,125

Project cost per ac. ft. = \$146,125 divided by 1,800 ac. ft. = \$81.2 / ac. ft.

(4a) Cost of purchasing replacement water for pumpers affected by high TDS during operation of project (per acre feet of project production at 150 ac. ft./yr during impacted years)

TABLE 7-10 Continued
PHASE I DESALTER
WITH SCENARIO 2 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
NET COST ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2012 | 2014 | 2016 | 2018 | 2020 | 2021 |
|---|------|------|------|------|------|------|------|
| DESALTER PRODUCTION, af/yr (1) | 1800 | 1800 | 1800 | 3600 | 1800 | 1800 | 1800 |
| RECHARGE WATER/INLIEU, af/yr (2) | 825 | 825 | 0 | 0 | 825 | 825 | 825 |
| PRODUCTION COST \$/af (3) | | | | | | | |
| Capital (3A) | 469 | 469 | 235 | 235 | 469 | 469 | 469 |
| O & M | | | | | | | |
| Fixed (3B) | 96 | 101 | 109 | 115 | 120 | 123 | 130 |
| Variable (3C) | 427 | 438 | 483 | 495 | 521 | 547 | 561 |
| Recharge/inlieu (4) | 189 | 196 | 0 | 0 | 256 | 266 | 286 |
| Misc. Well Displacement Water Cost (4a) | 0 | 0 | 0 | 0 | 74 | 79 | 82 |
| Sub Total | 1182 | 1202 | 827 | 857 | 1456 | 1484 | 1518 |
| MWDSC GRP Benefit (5) | 250 | 250 | 0 | 0 | 250 | 250 | 0 |
| Sub Total | 932 | 952 | 827 | 857 | 1179 | 1234 | 1159 |
| MWDSC SSS Benefit (6) | 125 | 128 | 73 | 78 | 161 | 172 | 183 |
| NET PROJECT WATER COST (7) | 807 | 823 | 754 | 779 | 1018 | 1062 | 975 |
| MWDSC Non Interruptible to So. Co. Agencies (8) | 786 | 812 | 924 | 954 | 1017 | 1085 | 1162 |

NOTES Continued:

(5) MWDSC GRP Benefit is a maximum of \$250 per ac. ft.

(6) MWDSC SSS Benefit is estimated at 50% project net groundwater production (1,800 ac. ft.) or 900 ac. ft. per year.
 Benefit is the difference in MWDSC noninterruptible water cost minus MWDSC SSS water cost.

Example: Year 2000

MWDSC Nonint:

\$688/ac. ft.

Total cost differential: \$190/ac. ft. times 900 ac. ft. = \$17100

MWDSC SSS:

\$478/ac. ft.

Total project benefit: \$171,000 divided by 1,800 ac. ft. = \$95/ac. ft.

Difference (Benefit):

(7) Net Project Cost is the total project cost per ac. ft.

(8) Estimated MWDSC noninterruptible treated and SSS water cost from Scenario 1 as provided by MWDOC December 1993.

TABLE 7-11
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER COST
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 3,600 | 3,600 | 3,600 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 543 | 553 | 576 | 596 | 583 | 594 | 588 | 608 | 626 | 894 | 865 | 885 | 907 |
| MWDSC WATER COST, \$/AF | 570 | 609 | 642 | 662 | 605 | 613 | 621 | 641 | 659 | 683 | 701 | 720 | 742 |
| PROJECT COST, \$ (1) | | | | | | | | | | | | | |
| SMWD | 562,049 | 572,128 | 596,824 | 617,232 | 603,906 | 615,032 | 1,217,873 | 1,259,554 | 1,297,100 | 925,441 | 895,772 | 916,532 | 939,010 |
| MNWD | 147,040 | 149,677 | 156,138 | 161,477 | 157,990 | 160,901 | 318,613 | 329,517 | 339,340 | 242,108 | 234,347 | 239,778 | 245,658 |
| CVWD | 215,080 | 218,937 | 228,387 | 236,197 | 231,097 | 235,355 | 466,045 | 481,995 | 496,363 | 354,139 | 342,786 | 350,730 | 359,332 |
| TCWD | 52,935 | 53,885 | 56,211 | 58,133 | 56,877 | 57,925 | 114,703 | 118,628 | 122,164 | 87,161 | 84,366 | 86,321 | 88,438 |
| Total | 977,103 | 994,627 | 1,037,559 | 1,073,038 | 1,049,871 | 1,069,214 | 2,117,233 | 2,189,694 | 2,254,966 | 1,608,850 | 1,557,270 | 1,593,361 | 1,632,438 |
| SALE TO CVWD, \$ (2) | | | | | | | | | | | | | |
| SMWD | 590,304 | 630,300 | 665,160 | 685,568 | 626,283 | 634,692 | 1,286,209 | 1,327,890 | 1,365,436 | 706,671 | 725,451 | 745,270 | 768,199 |
| MNWD | 154,432 | 164,895 | 174,015 | 179,354 | 163,844 | 166,044 | 336,490 | 347,395 | 357,217 | 184,875 | 189,788 | 194,973 | 200,972 |
| CVWD | 225,892 | 241,197 | 254,538 | 262,347 | 239,660 | 242,878 | 492,195 | 508,145 | 522,513 | 270,423 | 277,609 | 285,193 | 293,967 |
| TCWD | 55,596 | 59,363 | 62,647 | 64,569 | 58,985 | 59,777 | 121,139 | 125,064 | 128,600 | 66,556 | 68,325 | 70,192 | 72,351 |
| Total | 1,026,225 | 1,095,756 | 1,156,359 | 1,191,838 | 1,088,773 | 1,103,392 | 2,236,033 | 2,308,494 | 2,373,766 | 1,228,525 | 1,261,173 | 1,295,628 | 1,335,488 |
| BENEFIT, \$ (3) | | | | | | | | | | | | | |
| SMWD | 28,256 | 58,171 | 68,336 | 68,336 | 22,377 | 19,660 | 68,336 | 68,336 | 68,336 | (218,770) | (170,321) | (171,262) | (170,811) |
| MNWD | 7,392 | 15,218 | 17,878 | 17,878 | 5,854 | 5,143 | 17,878 | 17,878 | 17,878 | (57,233) | (44,558) | (44,805) | (44,687) |
| CVWD | 10,813 | 22,260 | 26,150 | 26,150 | 8,563 | 7,523 | 26,150 | 26,150 | 26,150 | (83,717) | (65,177) | (65,537) | (65,364) |
| TCWD | 2,661 | 5,479 | 6,436 | 6,436 | 2,108 | 1,852 | 6,436 | 6,436 | 6,436 | (20,604) | (16,041) | (16,130) | (16,087) |
| Total | 49,122 | 101,129 | 118,800 | 118,800 | 38,902 | 34,178 | 118,800 | 118,800 | 118,800 | (380,324) | (296,097) | (297,734) | (296,949) |
| SUM OF BENEFIT CASH FLOW | 49,122 | 150,250 | 269,050 | 387,850 | 426,752 | 460,930 | 579,730 | 698,530 | 817,330 | 437,006 | 140,909 | (156,825) | (453,774) |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | % of tot |
|---------------------|----------|
| SMWD | 57.52% |
| MNWD | 15.05% |
| CVWD | 22.01% |
| TCWD | 5.42% |
| Total | 100.00% |

TABLE 7-11 Continued
PHASE I DESALTER
WITH SCENARIO 1 MWDSC WATER COST
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--------------------------|-----------|-------------|-------------|-------------|-------------|-------------|-----------|-------------|-------------|-------------|-------------|-------------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 3,600 | 3,600 | 3,600 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 929 | 952 | 976 | 1000 | 794 | 809 | 824 | 1172 | 1201 | 1233 | 1267 | 1004 |
| MWDSC WATER COST, \$/AF | 765 | 788 | 813 | 839 | 864 | 891 | 919 | 947 | 974 | 1007 | 1038 | 1070 |
| PROJECT COST, \$ (1) | | | | | | | | | | | | |
| SMWD | 962,263 | 985,824 | 1,010,651 | 1,035,801 | 1,644,728 | 1,675,403 | 1,706,846 | 1,213,918 | 1,243,824 | 1,276,902 | 1,312,271 | 1,039,416 |
| MNWD | 251,741 | 257,905 | 264,400 | 270,980 | 430,284 | 438,309 | 446,535 | 317,578 | 325,402 | 334,056 | 343,308 | 271,926 |
| CVWD | 368,230 | 377,246 | 386,747 | 396,371 | 629,390 | 641,128 | 653,161 | 464,531 | 475,975 | 488,634 | 502,168 | 397,754 |
| TCWD | 90,628 | 92,848 | 95,186 | 97,555 | 154,905 | 157,794 | 160,755 | 114,330 | 117,147 | 120,262 | 123,593 | 97,895 |
| Total | 1,672,862 | 1,713,823 | 1,756,984 | 1,800,708 | 2,859,306 | 2,912,635 | 2,967,297 | 2,110,357 | 2,162,347 | 2,219,854 | 2,281,340 | 1,806,991 |
| SALE TO CVWD, \$ (2) | | | | | | | | | | | | |
| SMWD | 792,166 | 816,138 | 842,184 | 868,235 | 1,788,578 | 1,844,837 | 1,903,176 | 980,762 | 1,008,905 | 1,042,229 | 1,074,491 | 1,107,752 |
| MNWD | 207,242 | 213,513 | 220,327 | 227,142 | 467,917 | 482,635 | 497,898 | 256,581 | 263,944 | 272,662 | 281,102 | 289,804 |
| CVWD | 303,139 | 312,312 | 322,280 | 332,248 | 684,437 | 705,966 | 728,290 | 375,309 | 386,079 | 398,831 | 411,177 | 423,905 |
| TCWD | 74,608 | 76,866 | 79,319 | 81,773 | 168,453 | 173,752 | 179,246 | 92,371 | 95,021 | 98,160 | 101,198 | 104,331 |
| Total | 1,377,156 | 1,418,830 | 1,464,110 | 1,509,398 | 3,109,386 | 3,207,191 | 3,308,610 | 1,705,023 | 1,753,948 | 1,811,882 | 1,867,968 | 1,925,791 |
| BENEFIT, \$ (3) | | | | | | | | | | | | |
| SMWD | (170,096) | (169,686) | (168,466) | (167,567) | 143,851 | 169,434 | 196,330 | (233,156) | (234,919) | (234,673) | (237,779) | 68,336 |
| MNWD | (44,500) | (44,392) | (44,073) | (43,838) | 37,633 | 44,326 | 51,363 | (60,997) | (61,458) | (61,394) | (62,206) | 17,878 |
| CVWD | (65,091) | (64,934) | (64,467) | (64,123) | 55,048 | 64,838 | 75,130 | (89,222) | (89,897) | (89,803) | (90,991) | 26,150 |
| TCWD | (16,020) | (15,981) | (15,867) | (15,782) | 13,548 | 15,958 | 18,491 | (21,959) | (22,125) | (22,102) | (22,395) | 6,436 |
| Total | (295,707) | (294,994) | (292,873) | (291,309) | 250,080 | 294,556 | 341,314 | (405,334) | (408,399) | (407,972) | (413,372) | 118,800 |
| SUM OF BENEFIT CASH FLOW | (749,481) | (1,044,475) | (1,337,348) | (1,628,658) | (1,378,578) | (1,084,022) | (742,708) | (1,148,043) | (1,556,442) | (1,964,413) | (2,377,785) | (2,258,985) |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | % of tot |
|---------------------|----------|
| SMWD | 57.52% |
| MNWD | 15.05% |
| CVWD | 22.01% |
| TCWD | 5.42% |
| Total | 100.00% |

TABLE 7-12
PHASE I DESALTER
WITH SCENARIO 2 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 3,600 | 3,600 | 3,600 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 531 | 544 | 577 | 593 | 548 | 555 | 597 | 618 | 639 | 816 | 778 | 791 | 807 |
| MWDSC WATER COST, \$/AF | 585 | 628 | 665 | 688 | 632 | 641 | 650 | 672 | 693 | 720 | 740 | 761 | 786 |
| PROJECT COST, \$ (1) | | | | | | | | | | | | | |
| SMWD | 550,121 | 563,372 | 597,445 | 613,743 | 567,160 | 574,590 | 1,235,899 | 1,280,138 | 1,322,312 | 845,081 | 805,727 | 819,472 | 835,819 |
| MNWD | 143,919 | 147,386 | 156,300 | 160,564 | 148,377 | 150,321 | 323,329 | 334,902 | 345,935 | 221,085 | 210,790 | 214,385 | 218,662 |
| CVWD | 210,515 | 215,586 | 228,625 | 234,862 | 217,036 | 219,879 | 472,943 | 489,872 | 506,010 | 323,388 | 308,328 | 313,588 | 319,844 |
| TCWD | 51,812 | 53,060 | 56,269 | 57,804 | 53,417 | 54,116 | 116,400 | 120,567 | 124,539 | 79,592 | 75,886 | 77,180 | 78,720 |
| Total | 956,367 | 979,404 | 1,038,639 | 1,066,972 | 985,989 | 998,906 | 2,148,571 | 2,225,478 | 2,298,796 | 1,469,146 | 1,400,730 | 1,424,625 | 1,453,044 |
| SALE TO CVWD, \$ (2) | | | | | | | | | | | | | |
| SMWD | 605,835 | 649,972 | 688,974 | 712,489 | 654,238 | 663,683 | 1,346,262 | 1,392,084 | 1,435,843 | 744,981 | 765,831 | 787,721 | 813,756 |
| MNWD | 158,495 | 170,042 | 180,245 | 186,397 | 171,158 | 173,629 | 352,201 | 364,189 | 375,637 | 194,897 | 200,352 | 206,079 | 212,890 |
| CVWD | 231,836 | 248,725 | 263,650 | 272,649 | 250,358 | 253,972 | 515,175 | 532,710 | 549,455 | 285,083 | 293,062 | 301,438 | 311,401 |
| TCWD | 57,059 | 61,216 | 64,889 | 67,104 | 61,618 | 62,507 | 126,795 | 131,110 | 135,232 | 70,164 | 72,128 | 74,190 | 76,642 |
| Total | 1,053,225 | 1,129,956 | 1,197,759 | 1,238,638 | 1,137,373 | 1,153,792 | 2,340,433 | 2,420,094 | 2,496,166 | 1,295,125 | 1,331,373 | 1,369,428 | 1,414,688 |
| BENEFIT, \$ (3) | | | | | | | | | | | | | |
| SMWD | 55,714 | 86,600 | 91,529 | 98,746 | 87,079 | 89,094 | 110,363 | 111,947 | 113,531 | (100,100) | (39,896) | (31,750) | (22,063) |
| MNWD | 14,576 | 22,656 | 23,945 | 25,833 | 22,781 | 23,308 | 28,872 | 29,287 | 29,701 | (26,188) | (10,437) | (8,306) | (5,772) |
| CVWD | 21,320 | 33,139 | 35,025 | 37,787 | 33,323 | 34,094 | 42,233 | 42,839 | 43,445 | (38,305) | (15,267) | (12,150) | (8,443) |
| TCWD | 5,247 | 8,156 | 8,620 | 9,300 | 8,201 | 8,391 | 10,394 | 10,543 | 10,693 | (9,428) | (3,757) | (2,990) | (2,078) |
| Total | 96,858 | 150,552 | 159,120 | 171,666 | 151,384 | 154,886 | 191,862 | 194,616 | 197,370 | (174,020) | (69,357) | (55,197) | (38,355) |
| SUM OF BENEFIT CASH FLOW | 96,858 | 247,410 | 406,530 | 578,196 | 729,579 | 884,466 | 1,076,328 | 1,270,944 | 1,468,314 | 1,294,293 | 1,224,936 | 1,169,739 | 1,131,384 |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | | % of tot |
|---------------------|--|----------|
| SMWD | | 57.52% |
| MNWD | | 15.05% |
| CVWD | | 22.01% |
| TCWD | | 5.42% |
| Total | | 100.00% |

TABLE 7-12 Continued
PHASE I DESALTER
WITH SCENARIO 2 MWDSC WATER PRICING
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
BENEFIT ANALYSIS
\$ PER ACRE FOOT

| YEAR | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| PROJECT YIELD, AF/YR | 1,800 | 1,800 | 1,800 | 1,800 | 3,600 | 3,600 | 3,600 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 |
| PROJECT NET COST, \$/AF | 823 | 839 | 856 | 873 | 754 | 767 | 779 | 1018 | 1039 | 1062 | 1091 | 975 |
| MWDSC WATER COST, \$/AF | 812 | 838 | 866 | 895 | 924 | 954 | 986 | 1017 | 1048 | 1085 | 1122 | 1162 |
| PROJECT COST, \$ (1) | | | | | | | | | | | | |
| SMWD | 852,604 | 868,993 | 886,150 | 903,630 | 1,561,689 | 1,587,436 | 1,613,774 | 1,054,503 | 1,076,018 | 1,100,075 | 1,129,619 | 1,010,024 |
| MNWD | 223,053 | 227,341 | 231,829 | 236,402 | 408,560 | 415,296 | 422,186 | 275,873 | 281,501 | 287,795 | 295,524 | 264,237 |
| CVWD | 326,267 | 332,539 | 339,104 | 345,793 | 597,613 | 607,466 | 617,545 | 403,528 | 411,761 | 420,967 | 432,272 | 386,547 |
| TCWD | 80,301 | 81,844 | 83,460 | 85,106 | 147,084 | 149,509 | 151,990 | 99,316 | 101,342 | 103,608 | 106,391 | 95,127 |
| Total | 1,482,224 | 1,510,717 | 1,540,543 | 1,570,932 | 2,714,946 | 2,759,707 | 2,805,495 | 1,833,220 | 1,870,623 | 1,912,445 | 1,963,846 | 1,755,894 |
| SALE TO CVWD, \$ (2) | | | | | | | | | | | | |
| SMWD | 840,830 | 867,908 | 897,060 | 926,217 | 1,912,826 | 1,975,297 | 2,041,919 | 1,053,239 | 1,085,524 | 1,122,990 | 1,162,216 | 1,202,813 |
| MNWD | 219,973 | 227,057 | 234,684 | 242,311 | 500,422 | 516,766 | 534,195 | 275,542 | 283,988 | 293,790 | 304,052 | 314,673 |
| CVWD | 321,761 | 332,123 | 343,279 | 354,436 | 731,983 | 755,889 | 781,383 | 403,044 | 415,399 | 429,736 | 444,746 | 460,282 |
| TCWD | 79,192 | 81,742 | 84,488 | 87,234 | 180,155 | 186,039 | 192,313 | 99,197 | 102,238 | 105,766 | 109,461 | 113,284 |
| Total | 1,461,756 | 1,508,830 | 1,559,510 | 1,610,198 | 3,325,386 | 3,433,991 | 3,549,810 | 1,831,023 | 1,887,148 | 1,952,282 | 2,020,475 | 2,091,052 |
| BENEFIT, \$ (3) | | | | | | | | | | | | |
| SMWD | (11,774) | (1,086) | 10,911 | 22,587 | 351,137 | 387,861 | 428,145 | (1,264) | 9,506 | 22,915 | 32,597 | 192,789 |
| MNWD | (3,080) | (284) | 2,854 | 5,909 | 91,862 | 101,470 | 112,009 | (331) | 2,487 | 5,995 | 8,528 | 50,436 |
| CVWD | (4,506) | (416) | 4,175 | 8,643 | 134,370 | 148,423 | 163,839 | (484) | 3,638 | 8,769 | 12,474 | 73,775 |
| TCWD | (1,109) | (102) | 1,028 | 2,127 | 33,071 | 36,530 | 40,324 | (119) | 895 | 2,158 | 3,070 | 18,157 |
| Total | (20,469) | (1,888) | 18,968 | 39,267 | 610,440 | 674,284 | 744,316 | (2,197) | 16,526 | 39,837 | 56,669 | 335,157 |
| SUM OF BENEFIT CASH FLOW | 1,110,915 | 1,109,027 | 1,127,995 | 1,167,261 | 1,777,701 | 2,451,985 | 3,196,301 | 3,194,103 | 3,210,629 | 3,250,466 | 3,307,135 | 3,642,292 |

NOTES:

- (1) Total project cost prorated to each agency based on participation.
- (2) Agency sells its prorated yield to CVWD at the MWDSC rate.
- (3) The benefit is the difference between "Sale to CVWD" and the "Project Cost".
- (4) Participation is based on demands in the watershed at the start of the project estimated based on 1995 projected demands.

| PROJ. PARTICIPATION | % of tot |
|---------------------|----------|
| SMWD | 57.52% |
| MNWD | 15.05% |
| CVWD | 22.01% |
| TCWD | 5.42% |
| Total | 100.00% |

period (25 years). This is primarily due to the impacts of buying recharge water at the MWDSC seasonal storage rate.

Table 7-13 summarizes the total cash flow and present worth of the Phase I water storage case. The cash flow is summarized graphically in Figure 7-2.

NON-QUANTIFIABLE BENEFITS OF SJBA DESALTER PROJECT

Many of the benefits of the SJBA desalter project are not fully quantifiable at present, either due to the nature of the benefit, or the lack of complete documentation on the MWDSC's new rate structure. The current non-quantifiable benefits include:

1. Storage
2. Reliability
3. Local control
4. MWDSC Rate Impacts
 - a. New demand charge
 - b. Readiness to serve charge
 - c. Treated water peaking charge
 - d. Connection maintenance charge

The following discussions of these benefits are presented to assist the SJBA member agencies in further analyzing the project.

STORAGE

Southern Orange County is short of storage, based upon MWDSC's recommended criteria of seven average days' demand. The San Juan Basin presents an opportunity to access approximately 30,000 acre-feet of useable storage. The utilization of this storage is restricted by both water quality constraints and production facilities at present. Full development of the desalter project will provide for accessing 10,000 acre-feet of storage per year from the San Juan Basin at a withdrawal rate of 10 mgd. The current full development plan provides facilities to enable all SJBA members to benefit from this storage. Access to the storage will decrease the need for local reservoirs for emergency storage.

RELIABILITY

A major concern with respect to Southern California water supplies is the issue of reliability. Recently, the California Urban Water Agency (CUWA) sponsored a study developing procedures for quantifying the reliability of California's water supply. MWDOC, a member of CUWA, has integrated these procedures into an Orange County Water Reliability Study, produced jointly with the Orange County Water District. The results of the study show that Southern Orange County, because of its high dependence on imported MWDSC supplies, has a very poor reliability, compared to the MWDSC's recently established goals, and particularly when

TABLE 7-13

PHASE I DESALTER

CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE

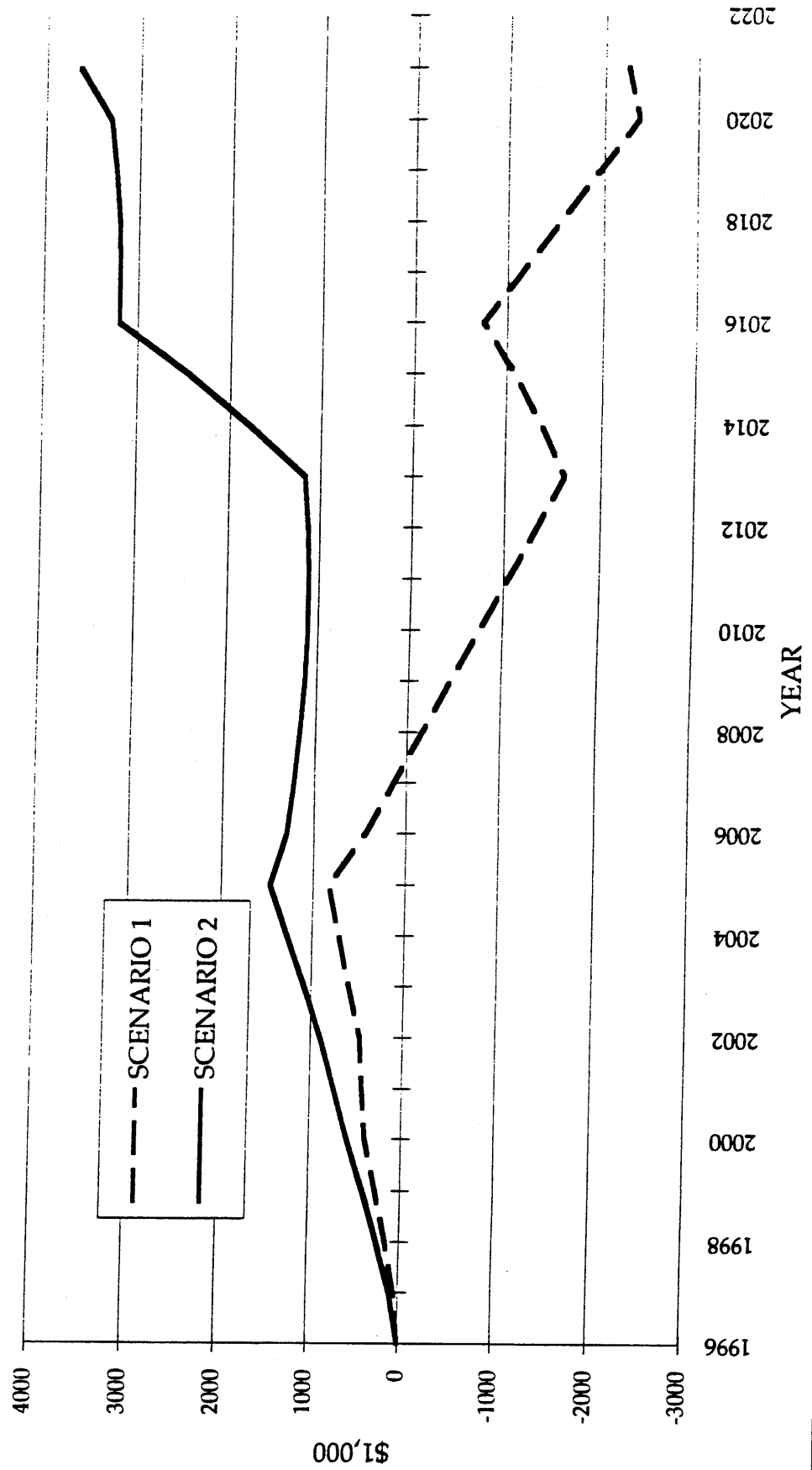
BENEFIT SUMMARY

| | SCENARIO 1 | SCENARIO 2 |
|---|--------------|--------------|
| CASH FLOW OF PROJECT | | |
| Total sum of annual project cost | \$45,419,730 | \$42,167,219 |
| Total cost of purchasing MWDSC water <u>without</u> project | 43,160,745 | 45,809,512 |
| Total savings in water cost with the project (benefit) | -2,258,985 | 3,642,292 |
| Benefit-to-cost ratio | 0.95 | 1.09 |
| | | |
| PRESENT WORTH | | |
| Total present worth of cash flow | 18,788,013 | 17,749,293 |
| Total present worth of cash flow to purchase MWDSC water <u>without</u> the project | 18,069,010 | 19,444,525 |
| Net present worth of project (benefit) | -719,003 | 1,695,232 |
| Benefit-to-cost ratio | 0.96 | 1.10 |

NOTES

1. Scenarios 1 and 2 as described on Table 7-3.
2. Values arrived from analysis of Tables 7-9, 7-10, 7-11 and 7-12.

FIGURE 7-2
PHASE 1 DESALTER
CONJUNCTIVE USE PROJECT AS SUPPLY AND STORAGE
SUM OF NET CASH FLOW



compared to Northern Orange County with its large Lower Santa Ana Groundwater Basin. Currently, Southern Orange County can expect water shortages of 15 percent or more 10 percent of the time, with shortages as large as 30 percent occurring 4 percent of the time. MWDSC's goal for retail agencies is a 2 percent probability of a shortage of 10 percent and a 10 percent probability of any shortage. Upon full implementation of the San Juan Basin desalter, San Mateo Basin project and proposed wastewater recycling, reliability approaching the MWDSC's retail agency goal can be achieved. The San Juan Basin desalter is particularly valuable because it is the largest Southern Orange County potable water project proposed.

LOCAL CONTROL

A key factor in the ability of retail water agencies to develop long-range plans with any degree of financial certainty is the degree to which local control is asserted over the sources of supply. An area highly dependent on imported MWDSC supplies can be severely impacted financially by changes in MWDSC's rate structure, water allocation policies, or delivery criteria. Development of the SJBA desalter project will help to manage the potential for disruptive change.

MWDSC NEW WATER RATE STRUCTURE

MWDSC, in December 1993, adopted a new rate structure which significantly affects potential water costs in Southern Orange County. The new rate structure includes:

- ▶ A basic commodity rate.
- ▶ Continuation of the existing Seasonal Storage Rate.
- ▶ A new demand charge of between \$1,000 per acre-foot and \$2,000 per acre-foot of new demand, based upon a four-year rolling average. This is called a "Capacity Acquisition Charge" and would be financed over 15 years.
- ▶ A treated water peaking charge for peaking over 130 percent of an average week.
- ▶ A readiness to serve charge allocated based upon an average of water purchased.
- ▶ A connection maintenance charge based upon the capacity of connections to MWDSC system.

These new rates would be implemented in 1995/96. Currently, MWDOC has not decided how it will pass these charges on to its member agencies. Consequently, the economic analysis for the SJBA desalter project is based upon a rate representing all of MWDSC's proposed water sales revenues divided by projected MWDSC water sales in acre-feet. In actuality, the proposed capacity acquisition charge and treated water peaking charge, if passed through directly, would severely impact Southern Orange County, due to projected growth and the need to peak off of the MWDSC water supplies. The savings from developing a firm water supply of 1,800 acre-feet per year in Phase I would be at least \$2.0 million, while the completed project of 5,000 acre-feet per year would save over \$6.0 million in capacity acquisition and treated water peaking

charges. The proposed readiness to serve charge will also be reduced. Development of the firm water supplies would eventually result in a reduced need for connected MWDSC capacity and a small annual savings on the service connection maintenance charge.

SUMMARY

The Phase I project is economically feasible as a water supply project as demonstrated with a benefit-to-cost ratio greater than one and net positive cash flow. The quantifiable economics of the storage elements are marginal and heavily dependant on imported water costs scenarios.

Many of the potential benefits to the SJBA cannot be fully quantified at this time. However, factors such as basin storage access, increased overall supply reliability, local control and ability to reduce proposed MWDSC charges all contribute to a more reliable and economical regional water system.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Comprehensive mathematical modeling studies were conducted of the San Juan Basin to develop management strategies so that the basin can be integrated into the potable water supply systems of the San Juan Basin Authority member agencies. Considerable benefits may be possible for these agencies particularly in times of drought as has been experienced between 1986 and 1993.

Based upon studies conducted herein and previous studies, it is concluded that the San Juan Basin acts as two subsystems separated by the Cristianitos Fault: The Upper San Juan Basin and the lower basins: Middle and Lower San Juan Basins and Lower Trabuco Basin. The Upper San Juan Basin was included in all phases of the operational studies; however, specific management schemes were not studied for this basin. It is shallow and has less storage capacity. This basin may be effectively used to increase in situ pumping of several hundred acre-feet per year. Depending on future conditions, the SJBA may want to consider incorporating this basin into a management plan. The main area that is useful for comprehensive management at this time is the lower basins, the focus of this report.

Historic sustained yield in the San Juan Basin was about 5,200 acre-feet per year. Sustained yield will gradually increase in the future due to development of the tributary watershed areas that will see increased irrigation with imported water. Return flows from this irrigation will increase subsurface inflow to the main basin and increased stream baseflows which will percolate in the main basin. As a consequence, current (1993) sustained yield is estimated to be 7,800 acre-feet per year, and under ultimate buildout of the tributary areas, sustained yield is estimated to be 9,000 acre-feet per year in the main San Juan Basin. The average additional sustained yield available to this project over its assumed 25-year life is at least 2,200 acre-feet per year and will probably be more once operational experience is gained in managing the basin.

Unless subsurface outflow to the ocean is controlled, the use of the San Juan Basin for long-term storage would have a penalty in lost water to subsurface outflow. The best use of the basin is short-term drought storage involving heavy pumping for a one- to three-year period. Depending upon the initial storage in the lower basins and duration of pumping, 6,500 to 34,000 acre-feet per year of additional water may be withdrawn from the groundwater. Recharge of water to replace short-term pumpage should follow withdrawal and be accomplished in such a way that rising water losses are minimized. Recharge could be accomplished by a combination of artificial recharge of imported water, reclaimed water, or in-lieu water exchange. The advantages of using reclaimed water have been previously discussed in this report. A pattern of extractions in the Lower San Juan Basin should be implemented to minimize subsurface outflow to the ocean and induce limited seawater intrusion. Limited seawater intrusion can substantially enhance the yield of the project in times of emergency such as drought or catastrophe when imported supplies are limited. This can be accomplished with limited pumping near the ocean in areas already affected with seawater intrusion.

The key strategy in developing a management plan for the San Juan Basin is flexibility, phasing and prototype demonstration. To be successful in implementing an ultimate optimal plan, management and operations infrastructure needs to be constructed.

Based upon studies conducted with the mathematical model, it appears that an ultimate plan would include an 8 mgd desalter for drought or emergency supplies, 12 extraction wells and a supply manifold, product waterline, pump station to the South County Pipeline, and direct connections to CVWD. This would provide the most flexible operating system. An ultimate system may have a capital cost of about \$34,000,000 (1993 dollars). However, due to the many uncertainties of how the basin will respond to such a project, due to the limited current hydrologic information, MWDSC future water pricing and current financial climate, a phased approach is suggested. A Phase I project is proposed that would include a 4 mgd desalter, five extraction wells, supply manifold and a product pipeline to CVWD. In addition, a basin monitoring plan would be developed and reviewed each year to assist in the development and implementation of the final project.

The Phase I facilities would produce an annual additional potable supply of 1,800 acre-feet per year, control groundwater gradients to minimize subsurface outflow to the ocean, and provide seasonal storage capacity. During times of drought or catastrophic emergencies, 3,600 acre-feet of potable supply could be produced by extracting water from storage within the basin and the inducing of a modest amount of seawater into the lowest reach of the Lower Basin.

The capital cost for the proposed Phase I facilities is estimated to be \$15,160,000 (1993 dollars). The economic feasibility of the project is complex. In a strict financial analysis, the Phase I project has a benefit-to-cost ratio, based on present worth, ranging from 0.96 as a water supply and storage project, to 1.18 as a water supply project only. However, there are numerous other benefits which must be considered which are difficult to assign a dollar value to. Primarily these include the increased water supply reliability for the project area by providing water from a local water resource. This project also helps offset the impact of MWDSC's projected shortfalls. MWDSC's water pricing concepts are rapidly changing. The same is true with their incentive to develop local water. It is anticipated that additional incentives may be available in the near future that may enhance the financial aspects of this project.

RECOMMENDATIONS

The following specific recommendations are proposed:

- 1) Continue with the water rights appropriation with the goal to appropriate all unappropriated waters of the San Juan Creek for the project.
- 2) Develop and implement a cooperative strategy with MWDOC to request MWDSC funding assistance by applying for participation in their Groundwater Recovery, Seasonal Storage and Local Projects programs. Explore the possibility of MWDSC participation in capital funding participation.
- 3) Initiate the CEQA process for the entire project.

- 4) File application for financial aid from State of California in the form of a low-interest loan.
- 5) Initiate the process to obtain a 25 percent grant from USBR.
- 6) Develop and implement a local funding plan for the portion of the project not funded by State loan or USBR grant.
- 7) Acquire rights-of-way or easements for the necessary facilities which include: desalting facility, well sites and pipelines.
- 8) Initiate design of Phase I facilities and develop a construction phasing plan.
- 9) Develop and initiate a monitoring and data reporting program that includes: measurement of groundwater levels, metering of pumped water, and groundwater quality sampling programs.
- 10) Develop a basin management program that includes the evaluation of the monitoring program and integration into the mathematical model to develop a projected annual water balance for the basin each year.
- 11) Initiate studies to explore the use and integration of reclaimed water into the basin. In particular, explore the use of recharged reclaimed water to increase sustained yield and recharged reclaimed water near the coast to aid in the control of water quality in the Lower San Juan Basin.

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APPENDIX A

SIMULATED WATER LEVELS AND TDS CONCENTRATIONS AT SELECTED NODES FOR THE SAN JUAN BASIN

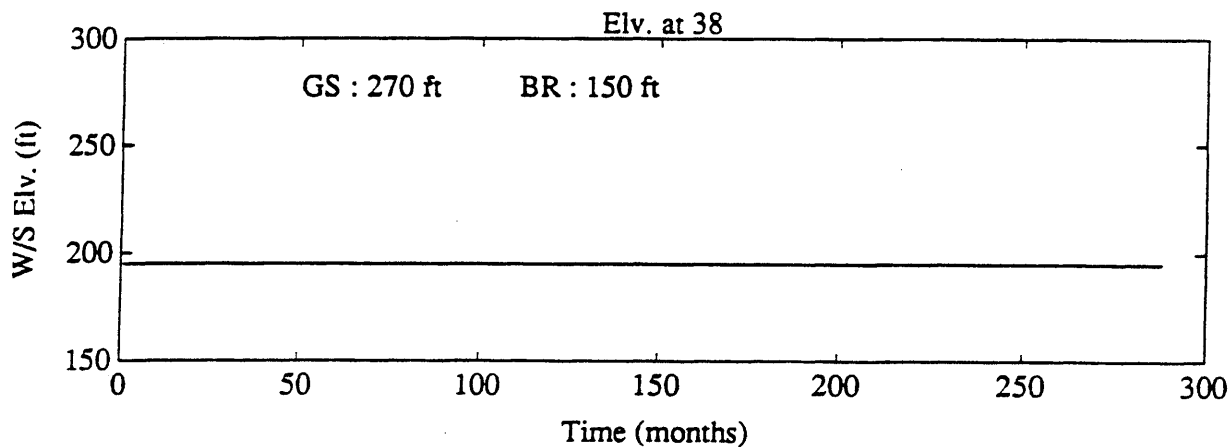
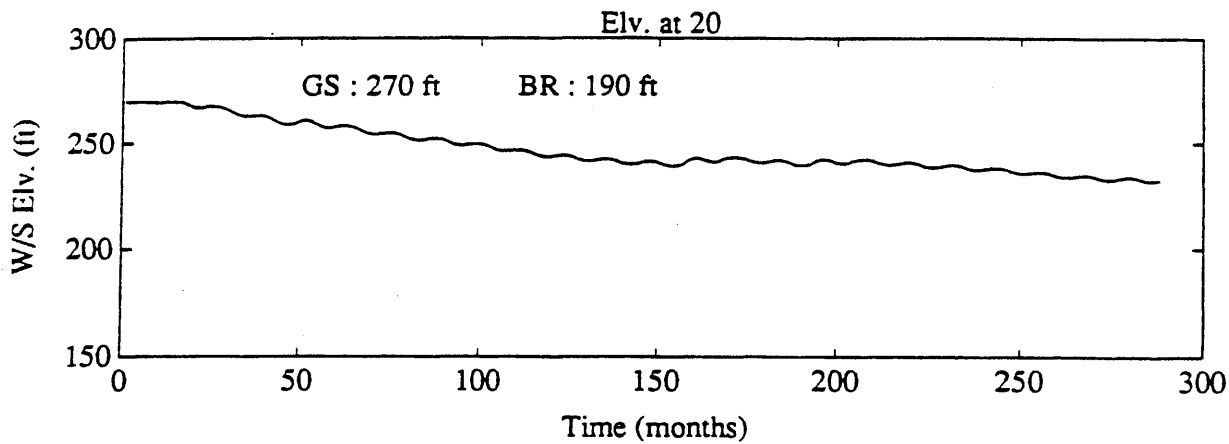
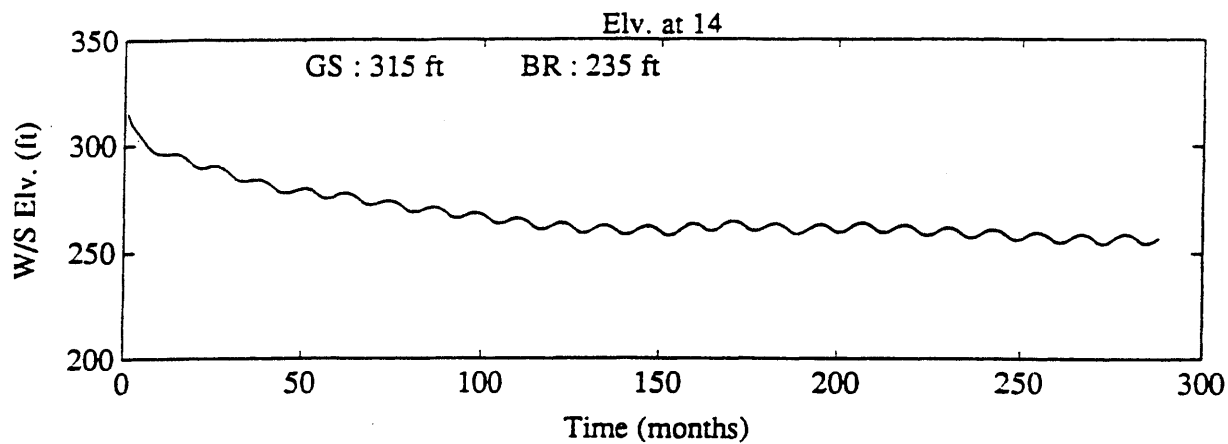
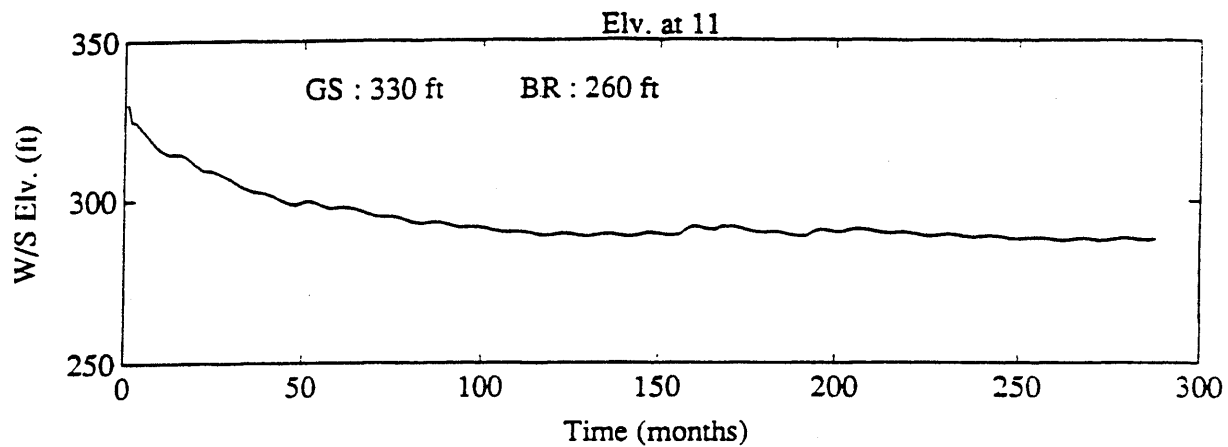
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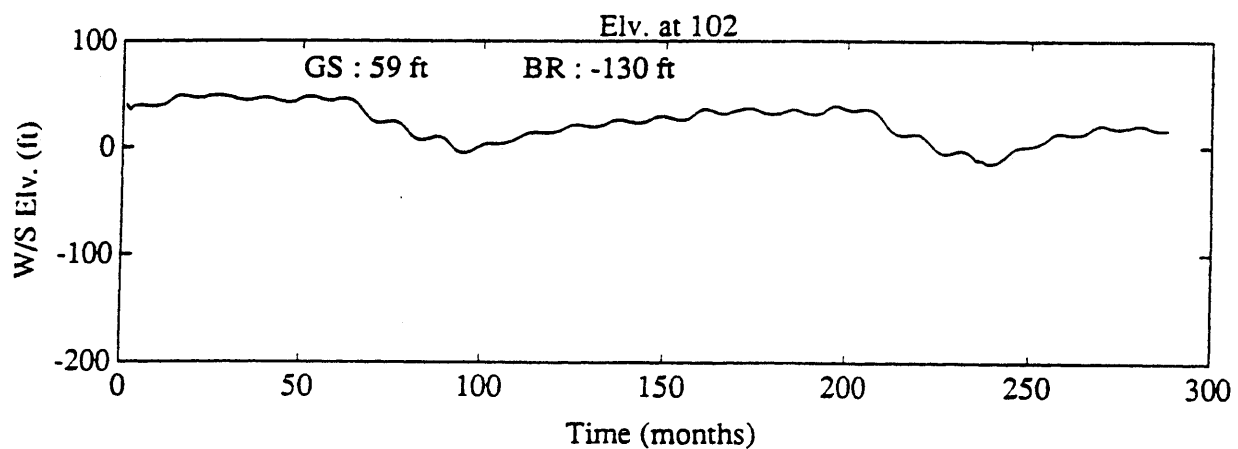
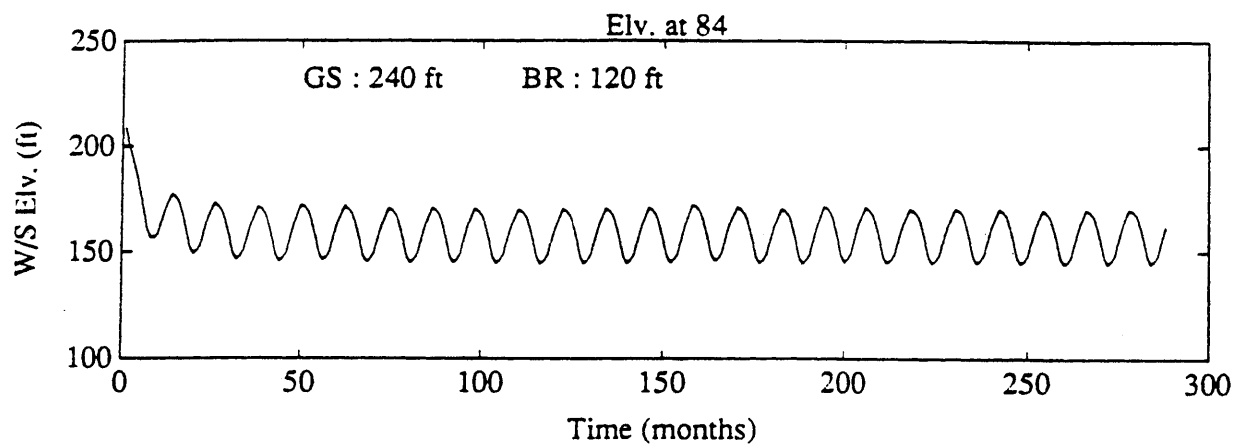
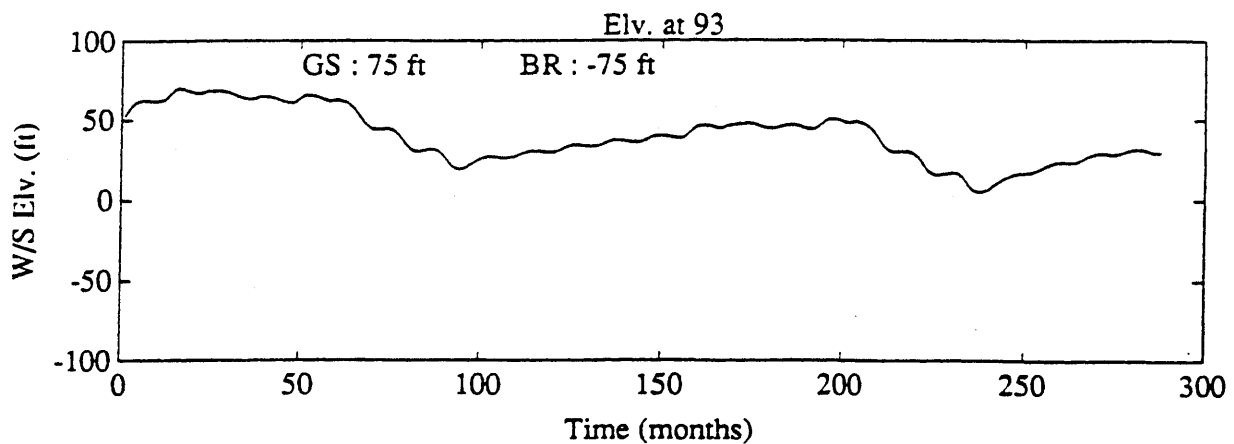
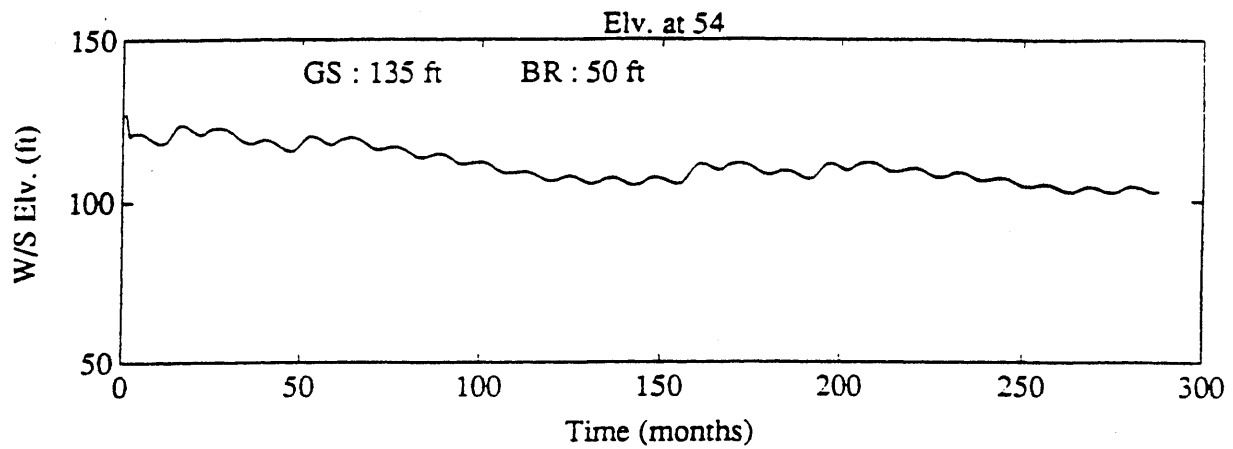
**SAN JUAN BASIN PRECIPITATION AND
PAN EVAPORATION FOR THE SIMULATION PERIOD**

| Year | Precipitation (in) | Pan Evaporation (in) |
|------|--------------------|----------------------|
| 1 | 20.37 | 51.75 |
| 2 | 28.55 | 51.75 |
| 3 | 7.22 | 51.75 |
| 4 | 14.82 | 51.75 |
| 5 | 26.97 | 51.75 |
| 6 | 11.47 | 51.75 |
| 7 | 13.1 | 51.75 |
| 8 | 16.47 | 51.75 |
| 9 | 10.15 | 51.75 |
| 10 | 9.38 | 51.75 |
| 11 | 15.46 | 51.75 |
| 12 | 15.73 | 51.75 |

**PHASE I OPERATION
SIMULATED WATER LEVELS
AT SELECTED NODES**

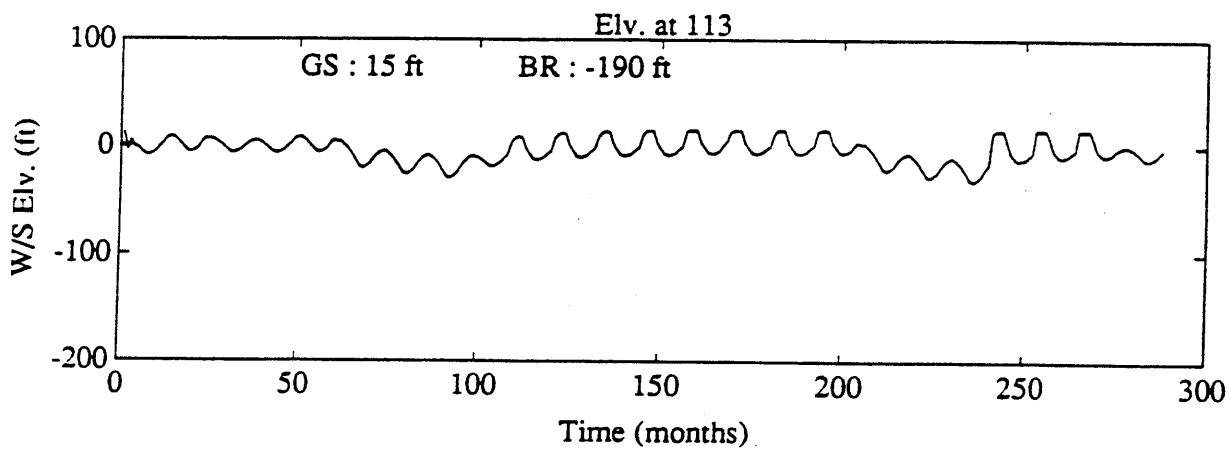
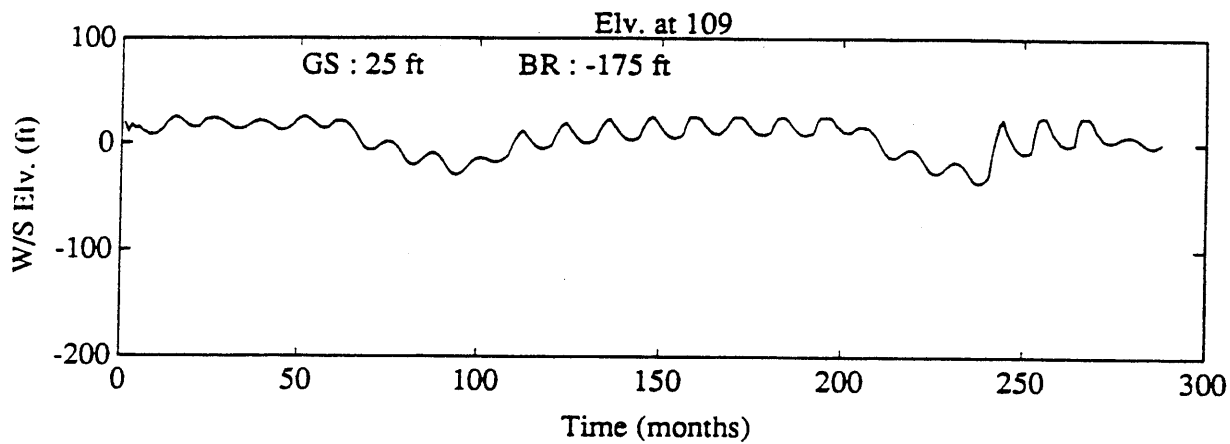
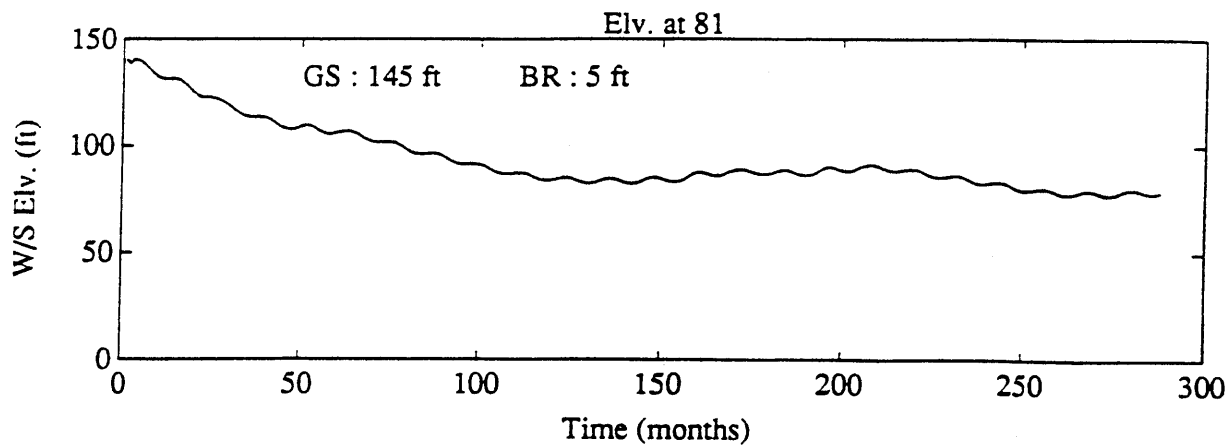
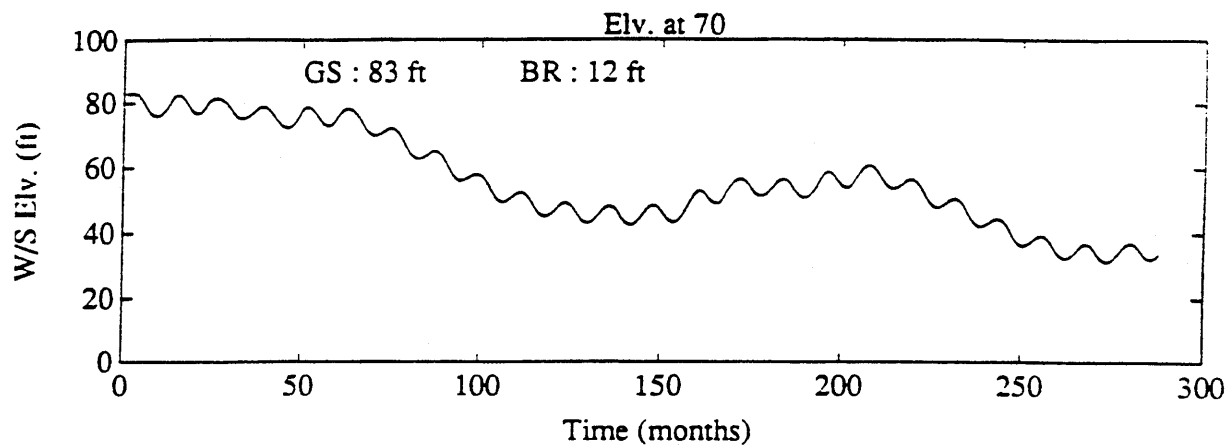
See Figure 3-1 for node locations

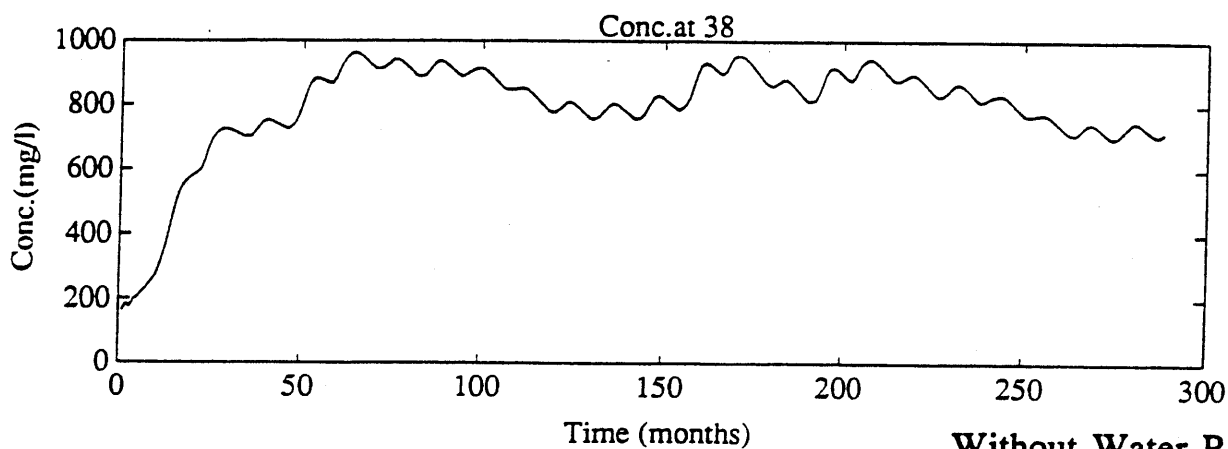
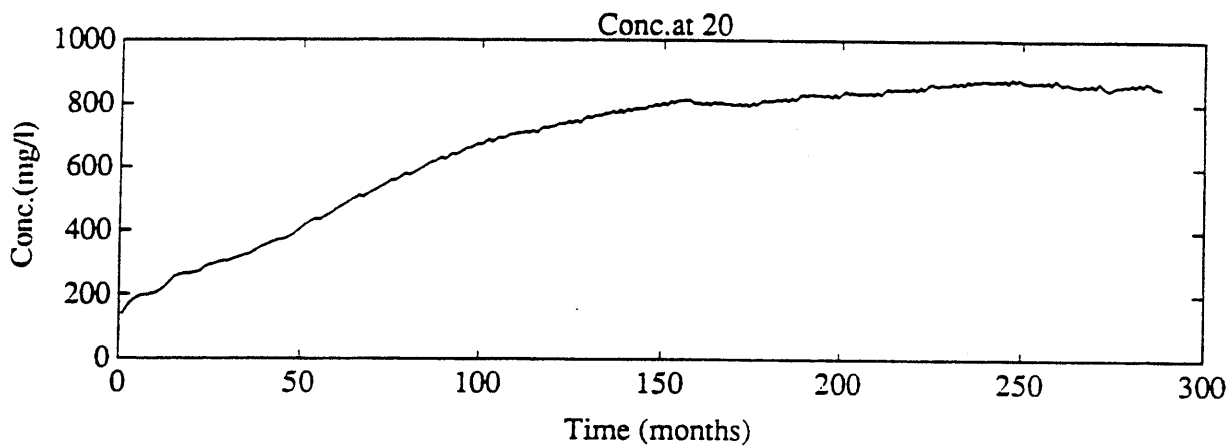
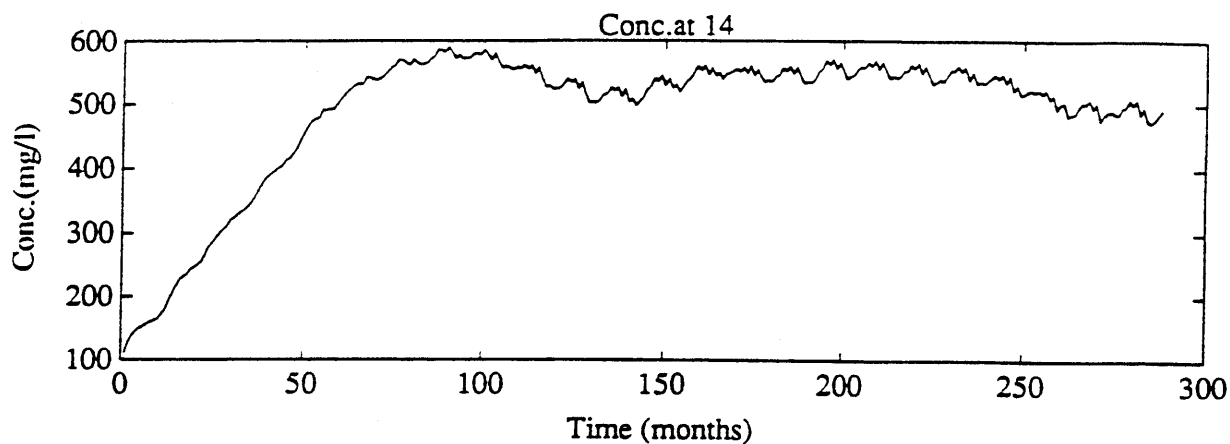
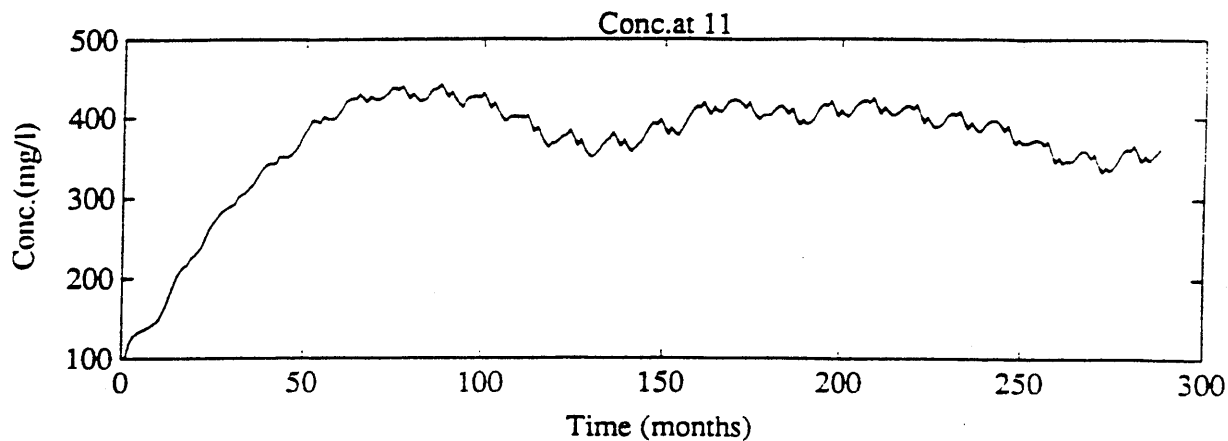




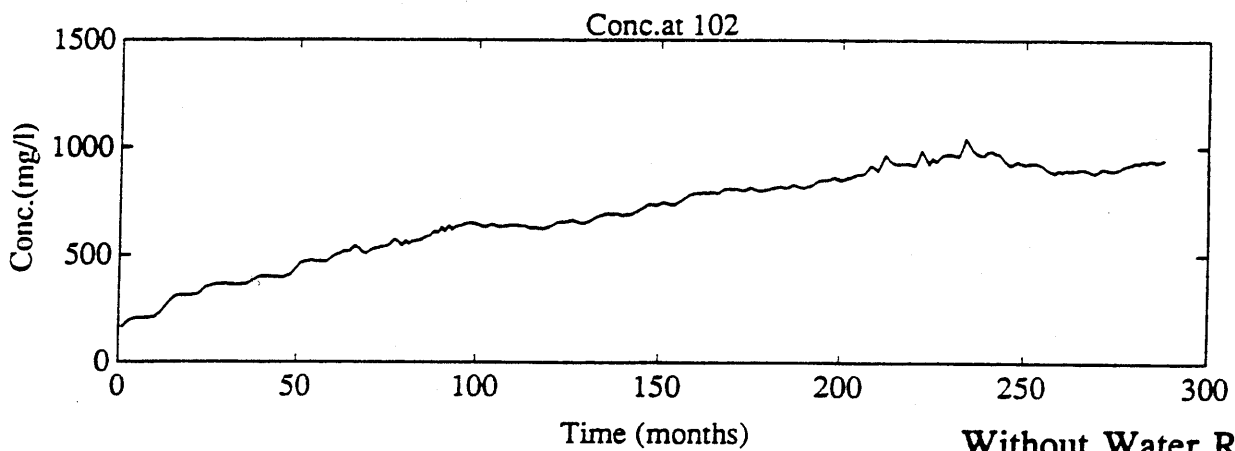
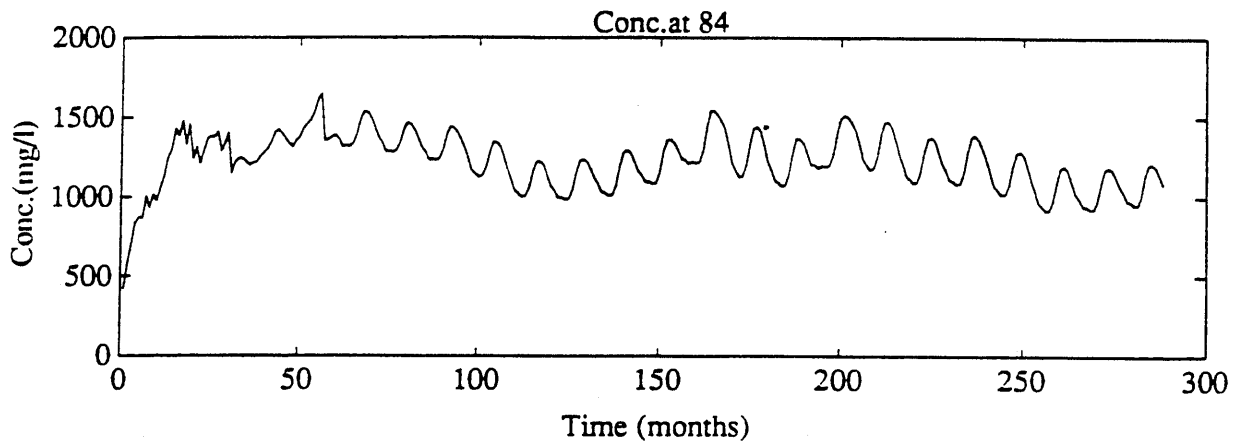
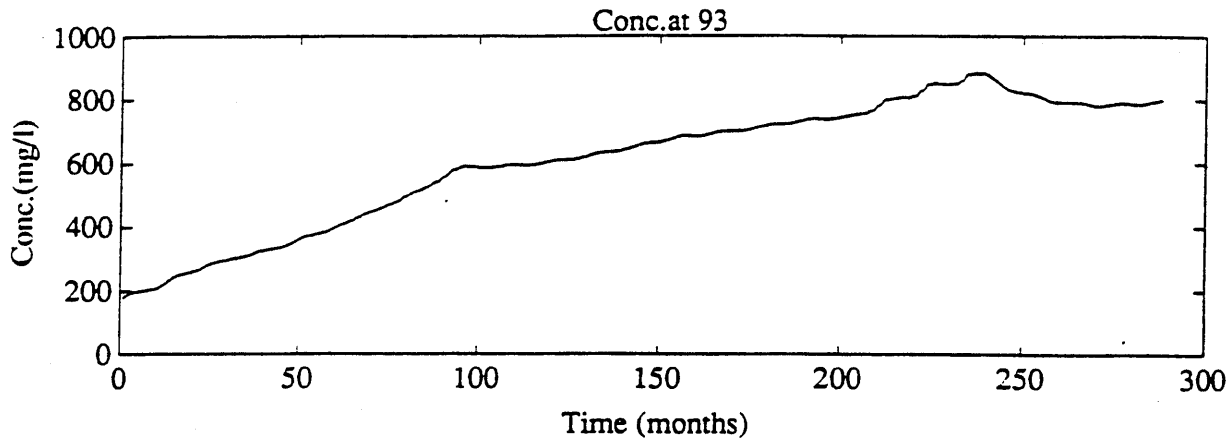
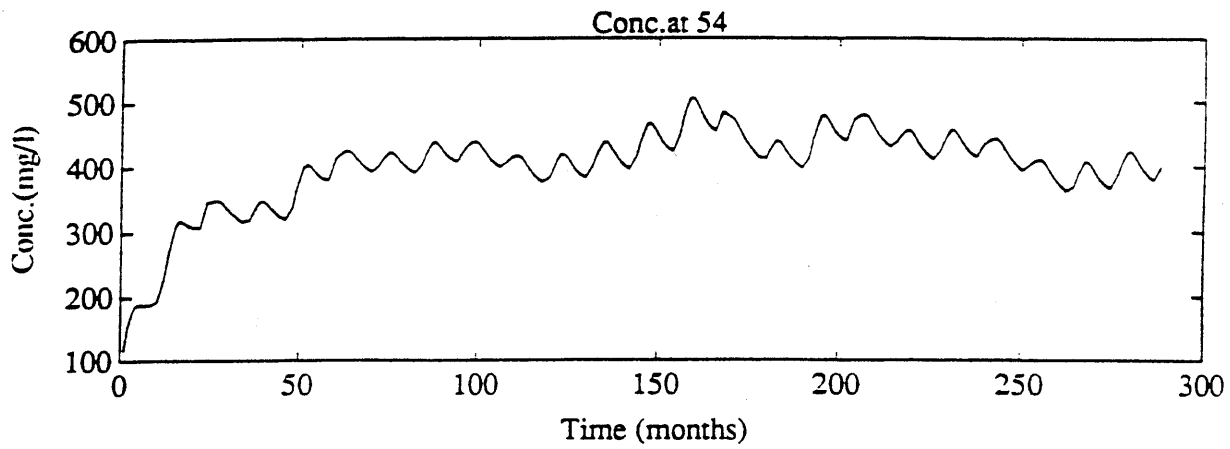
**PHASE I OPERATION
SIMULATED TDS CONCENTRATIONS
AT SELECTED NODES
WITHOUT RECLAMATION**

See Figure 3-1 for node locations

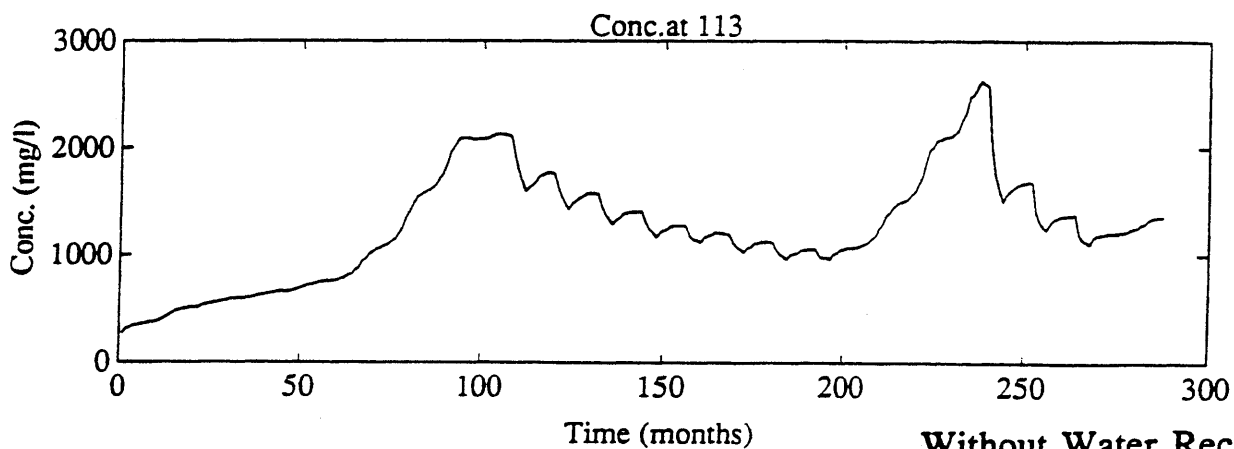
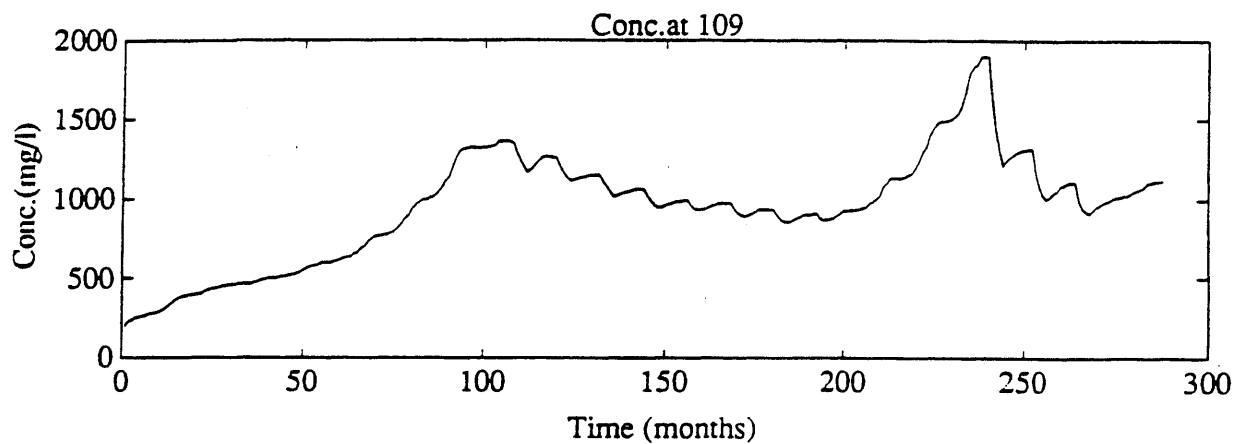
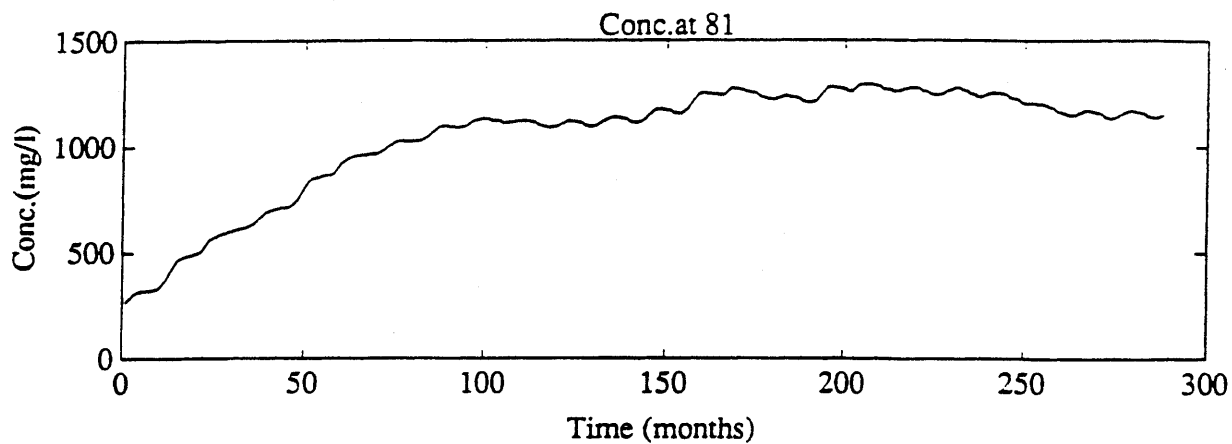
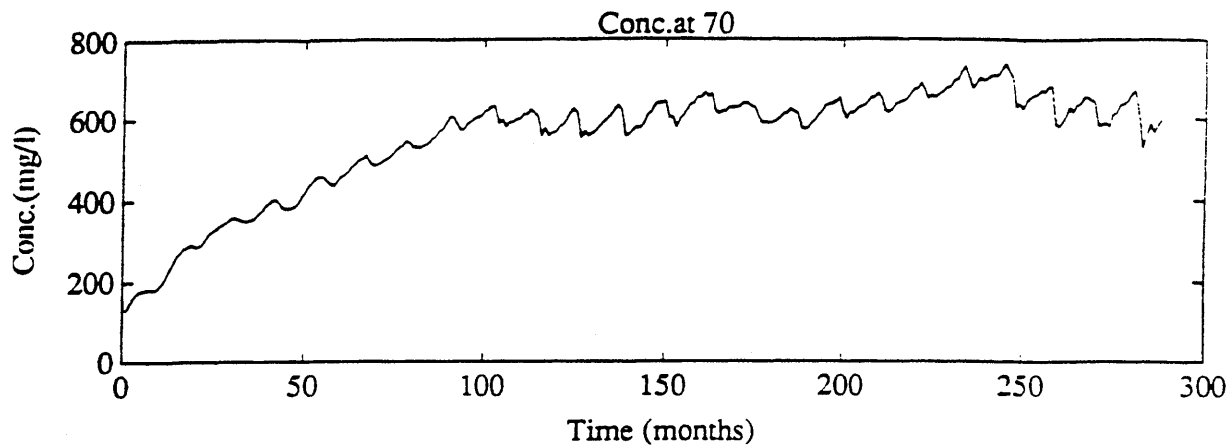




Without Water Reclamation
Plus SJBA Phase I Project



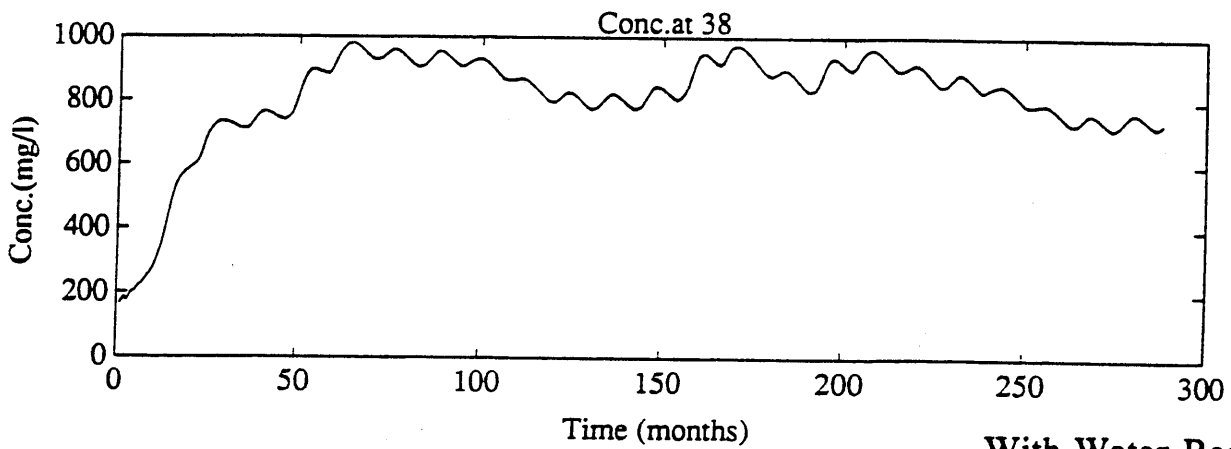
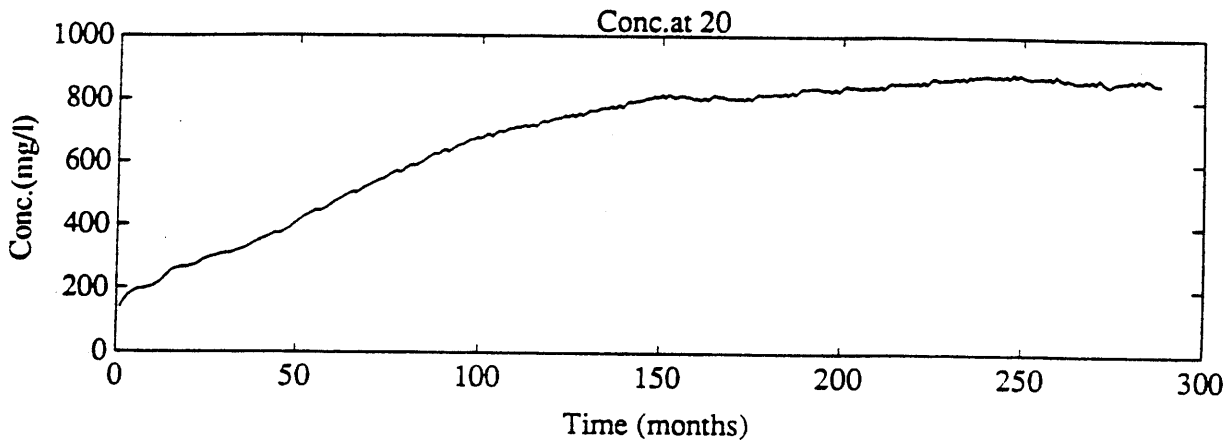
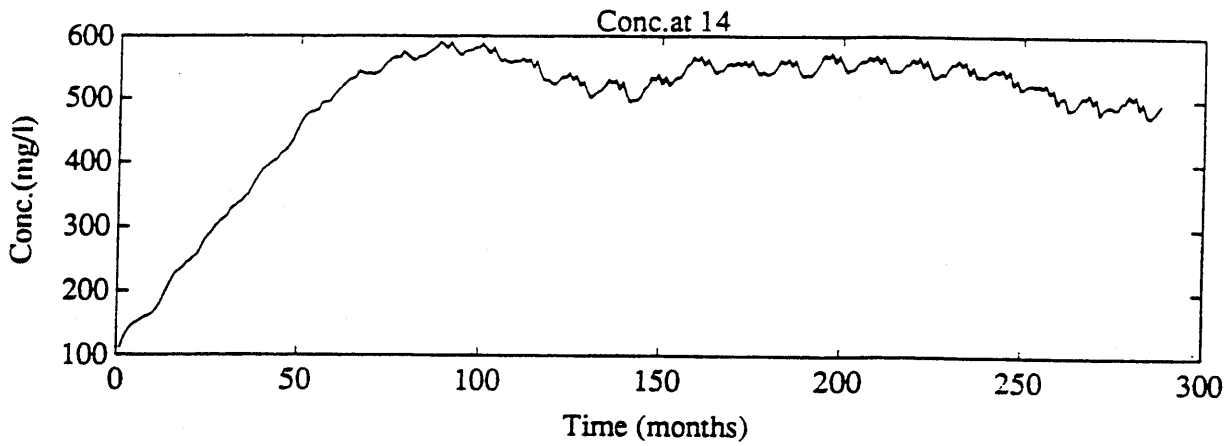
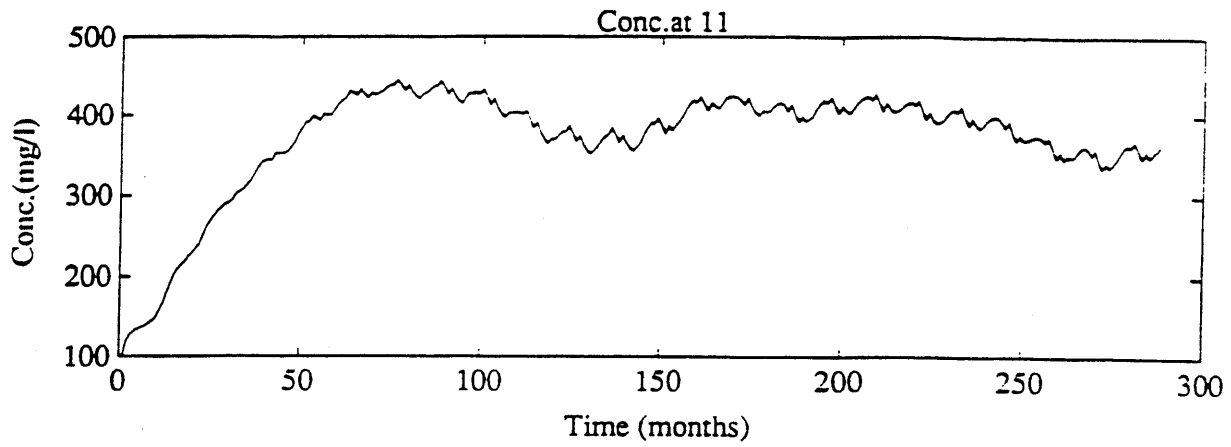
**Without Water Reclamation
Plus SJBA Phase I Project**

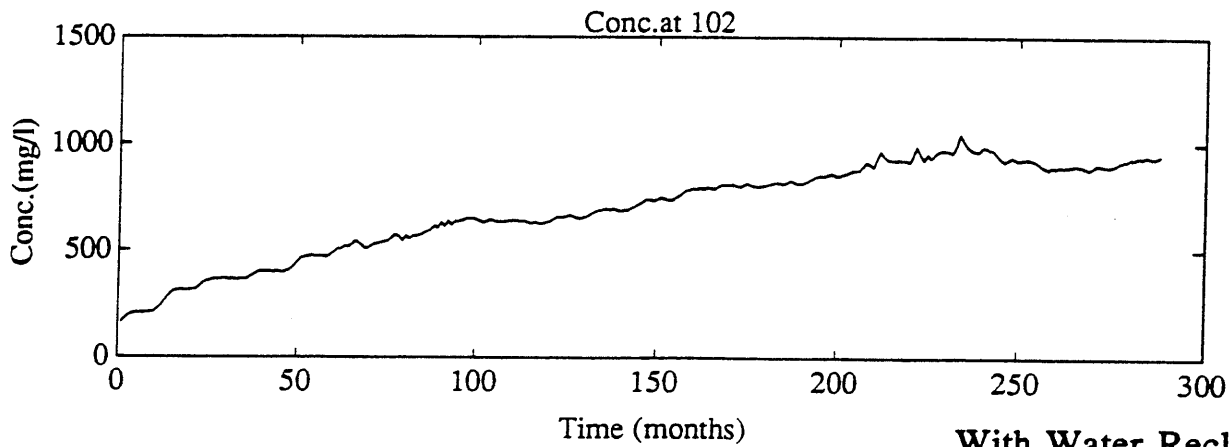
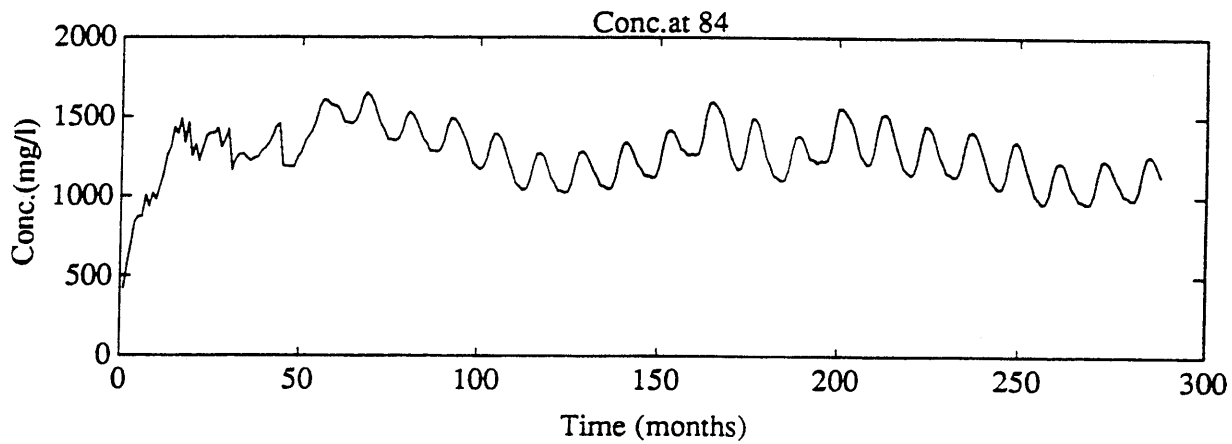
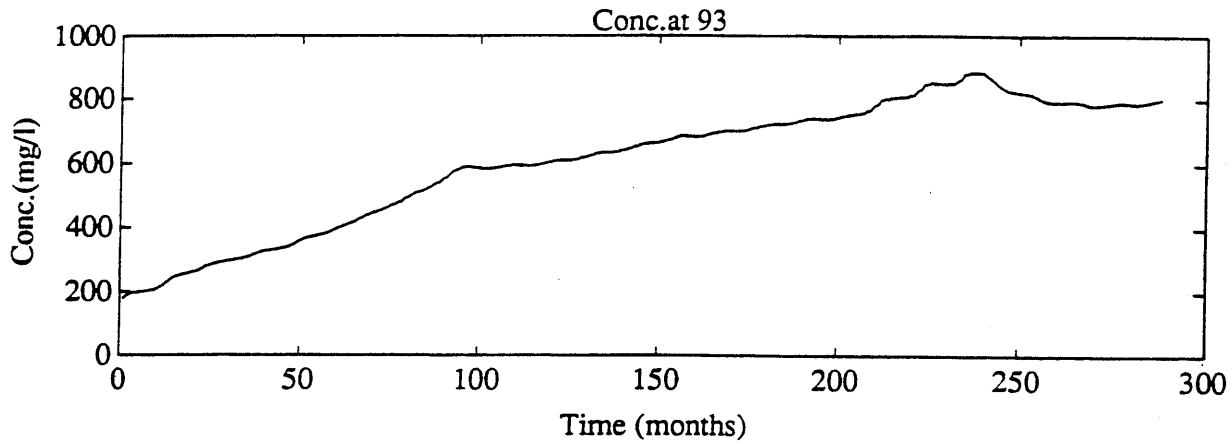
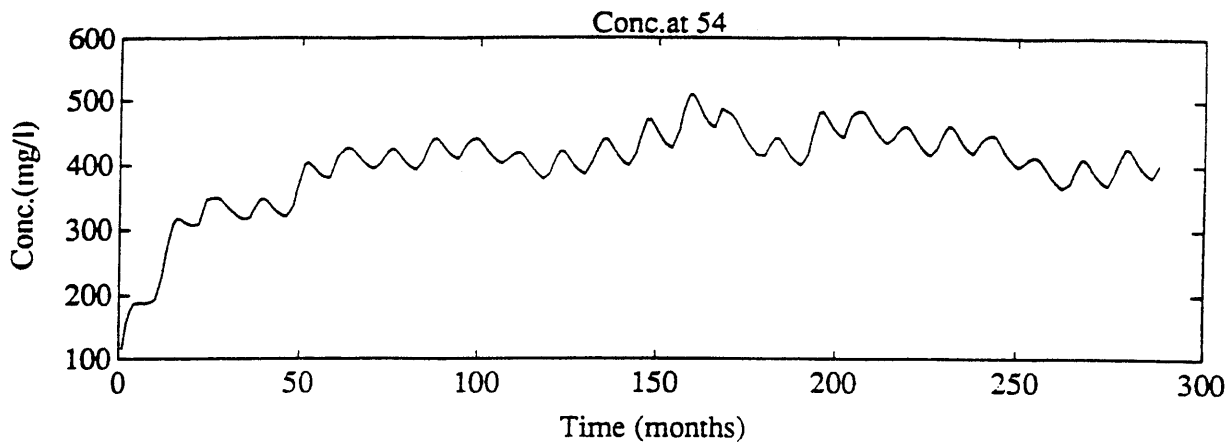


Without Water Reclamation
Plus SJBA Phase I Project

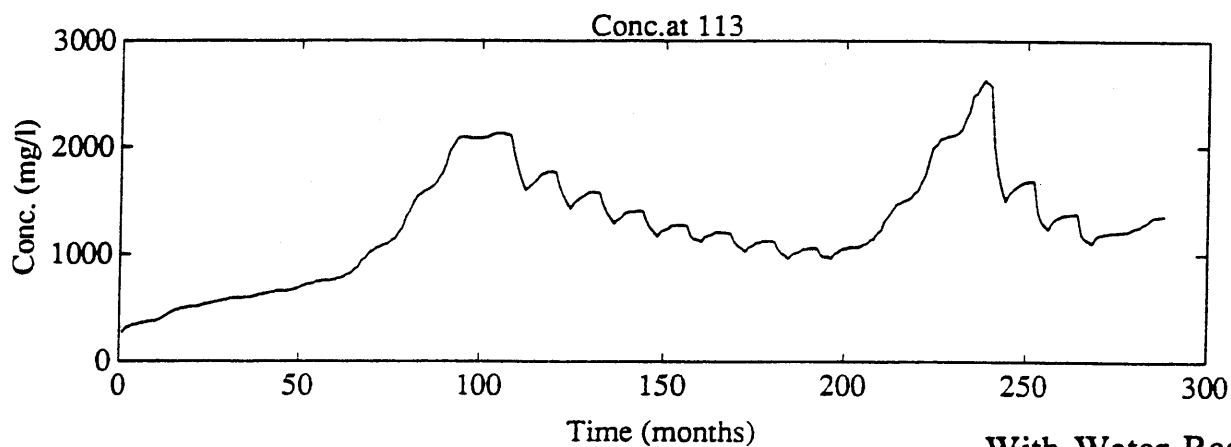
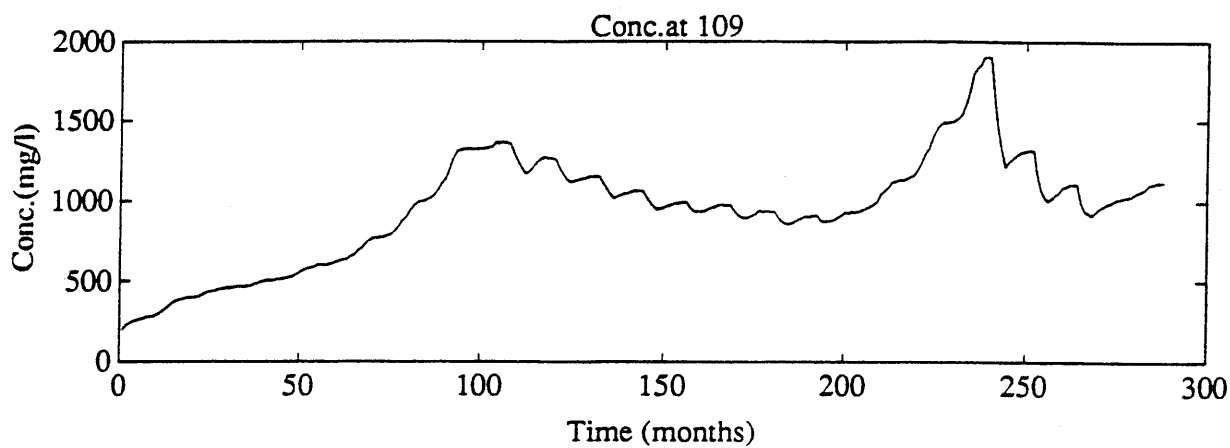
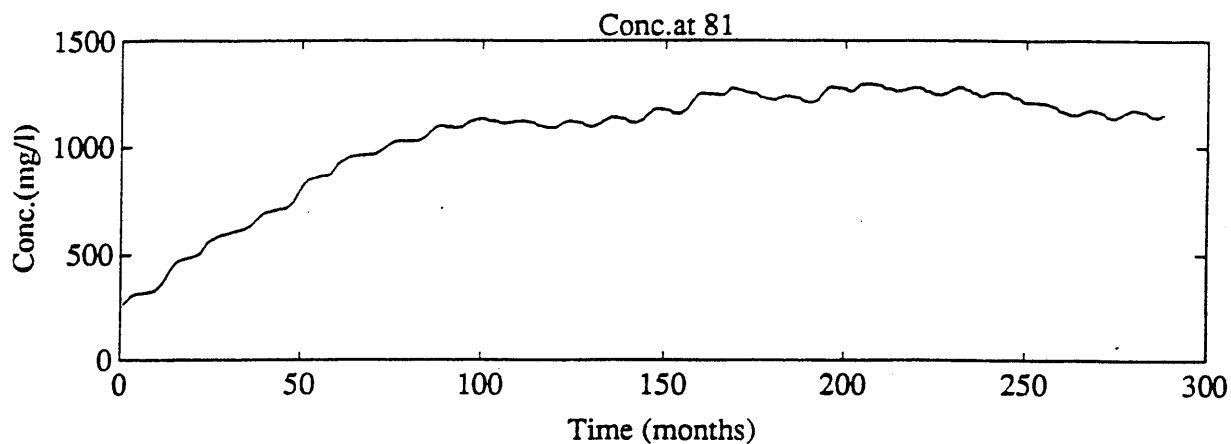
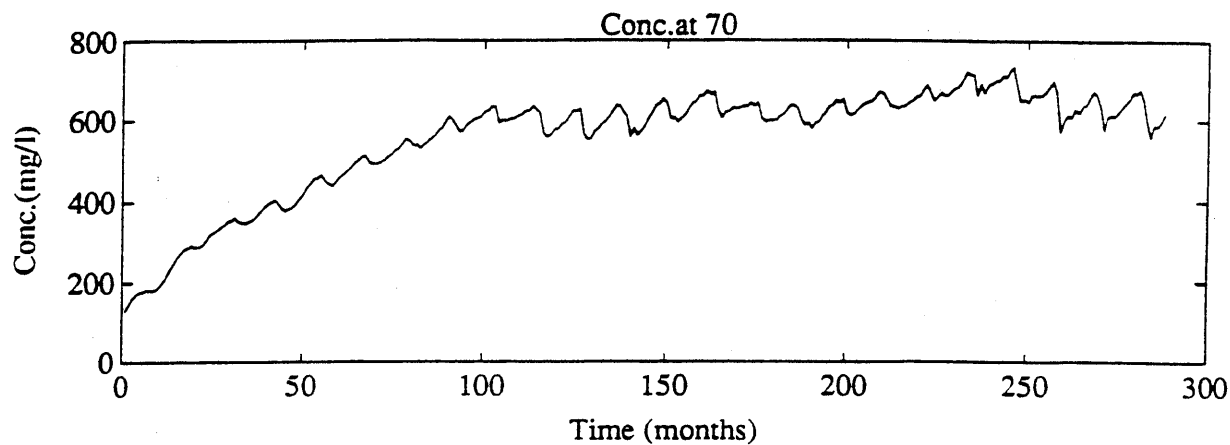
**PHASE I OPERATION
SIMULATED TDS CONCENTRATIONS
AT SELECTED NODES
WITH RECLAMATION**

See Figure 3-1 for node locations



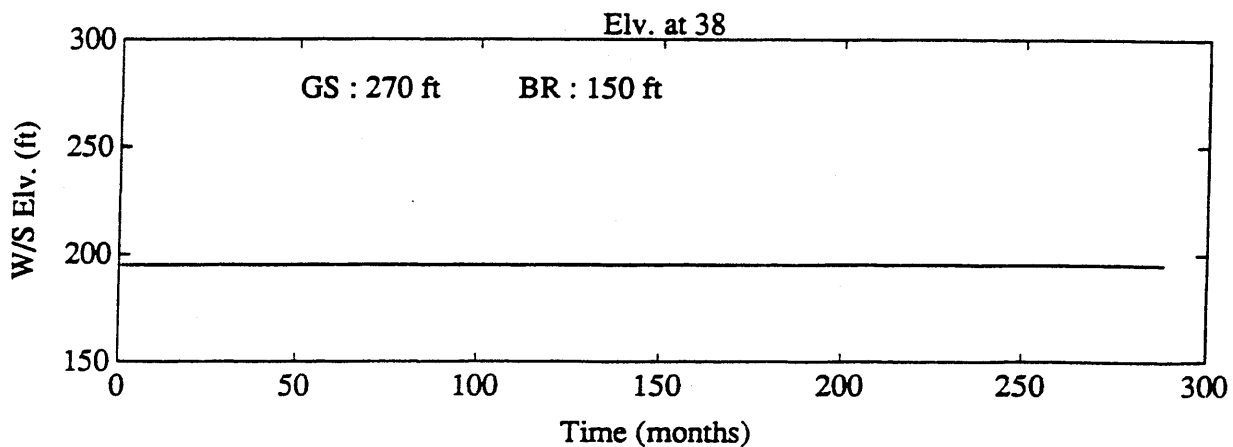
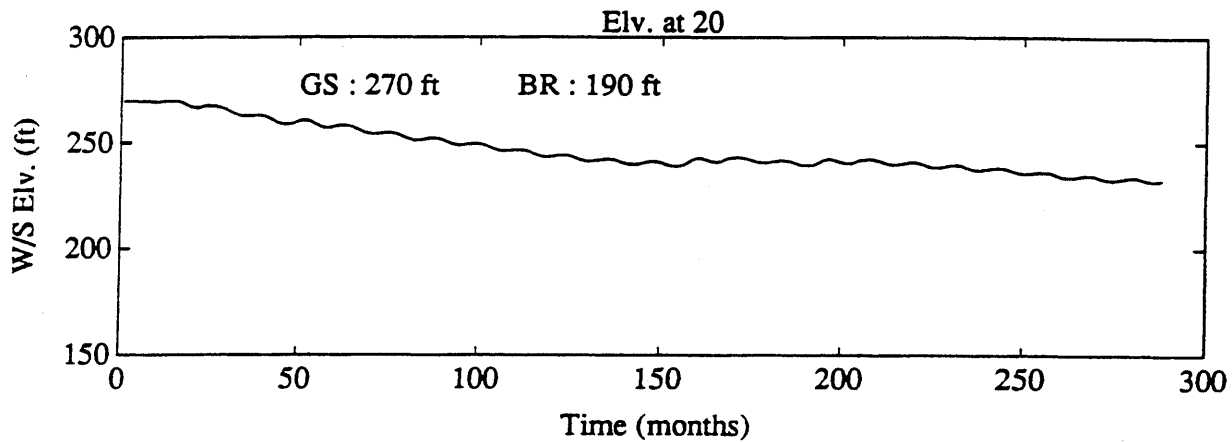
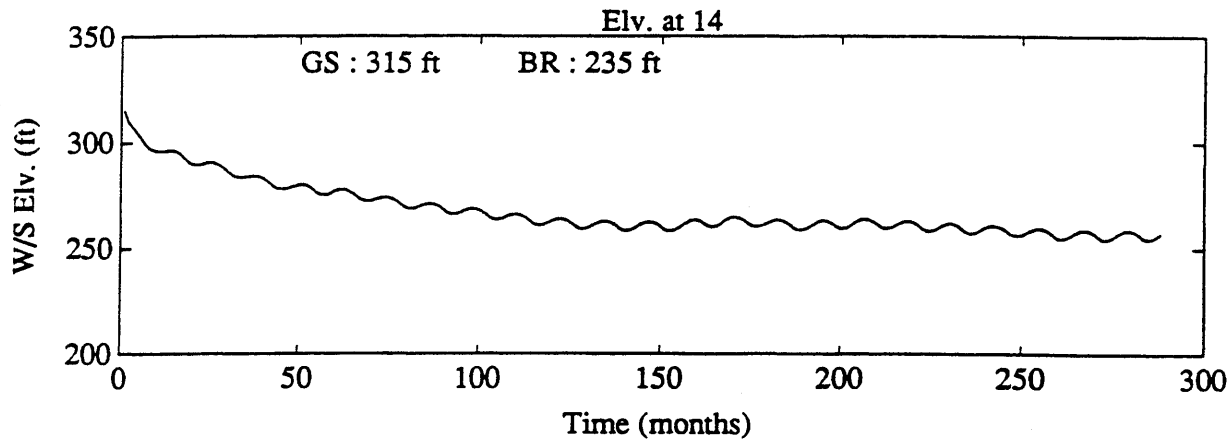
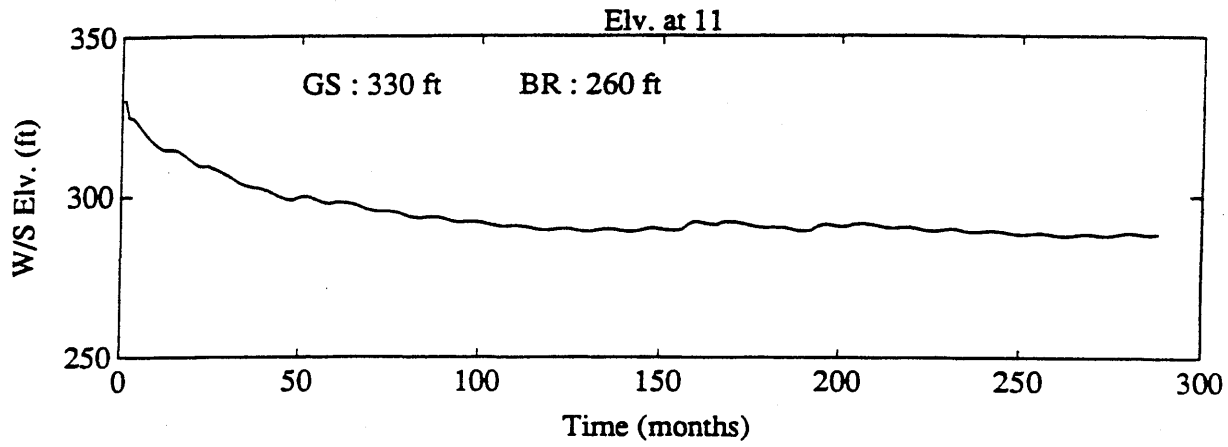


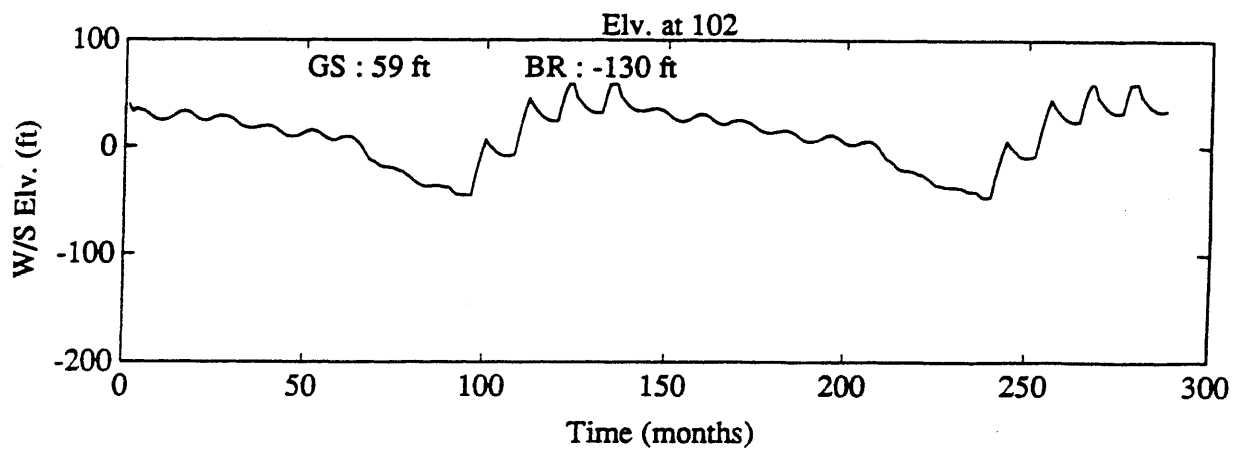
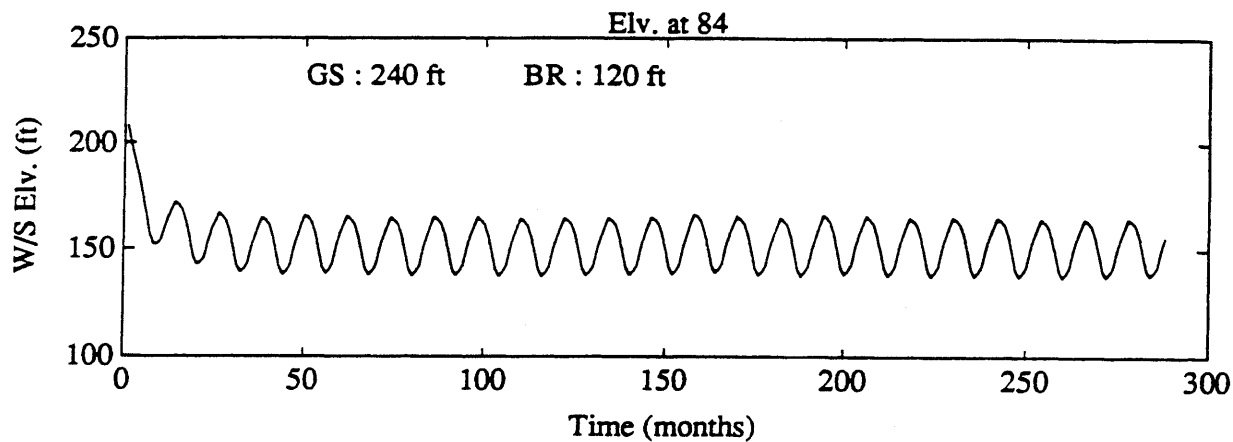
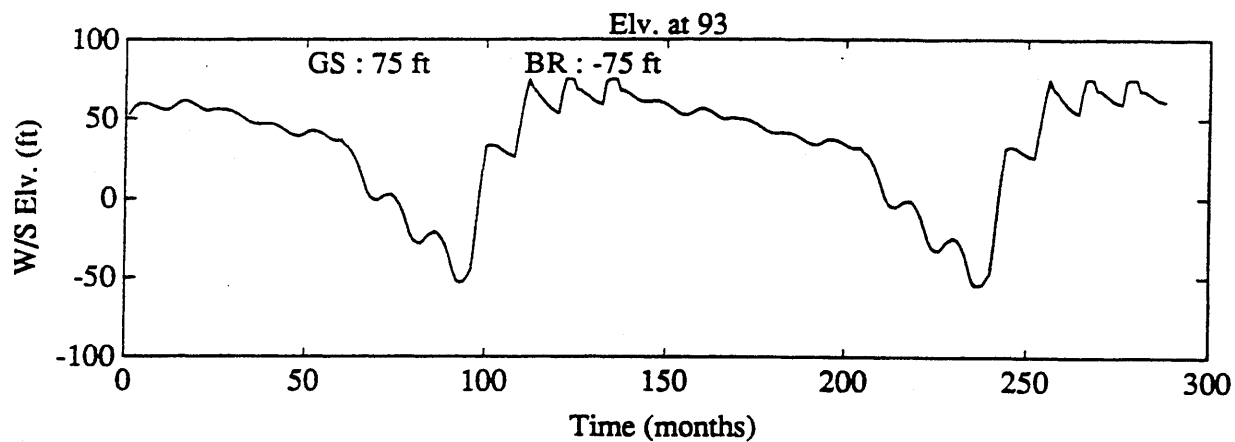
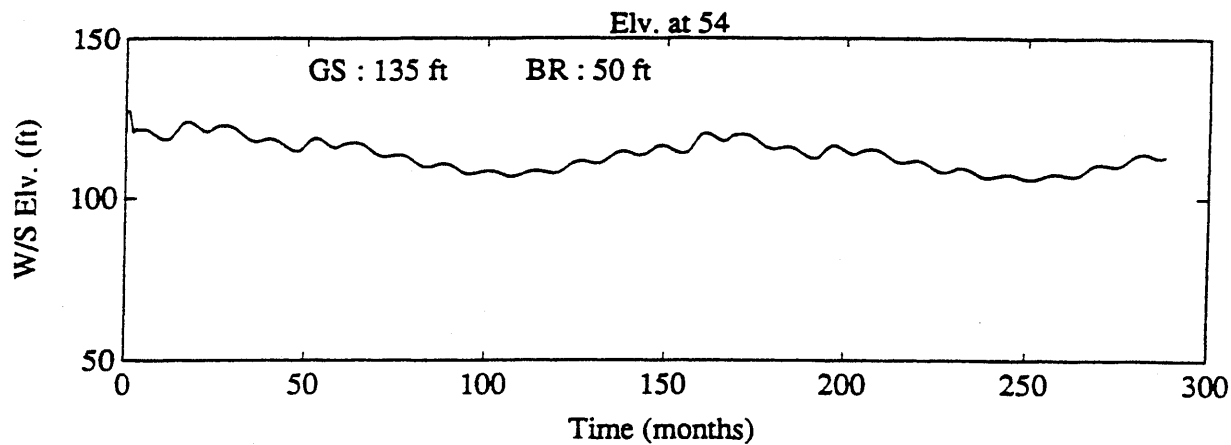
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Plus SJBA Phase I Project

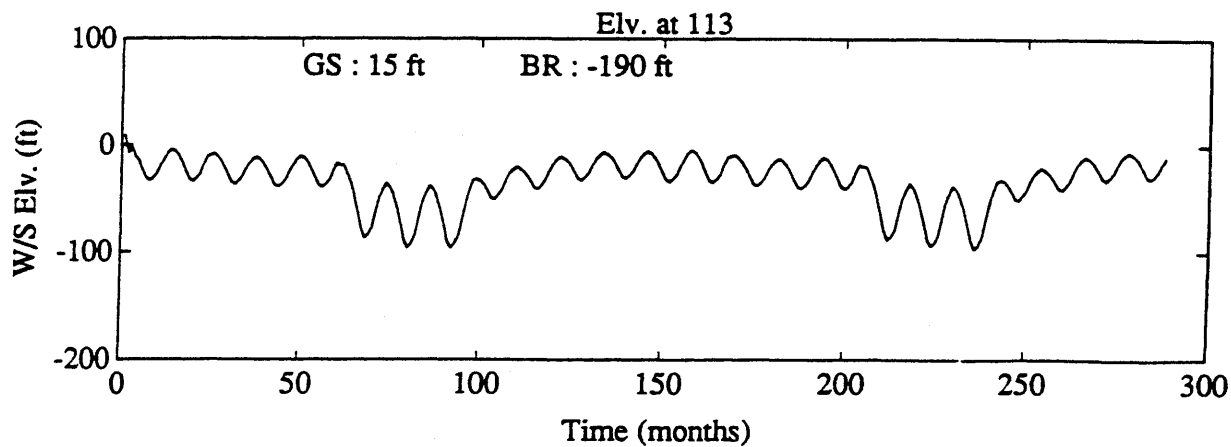
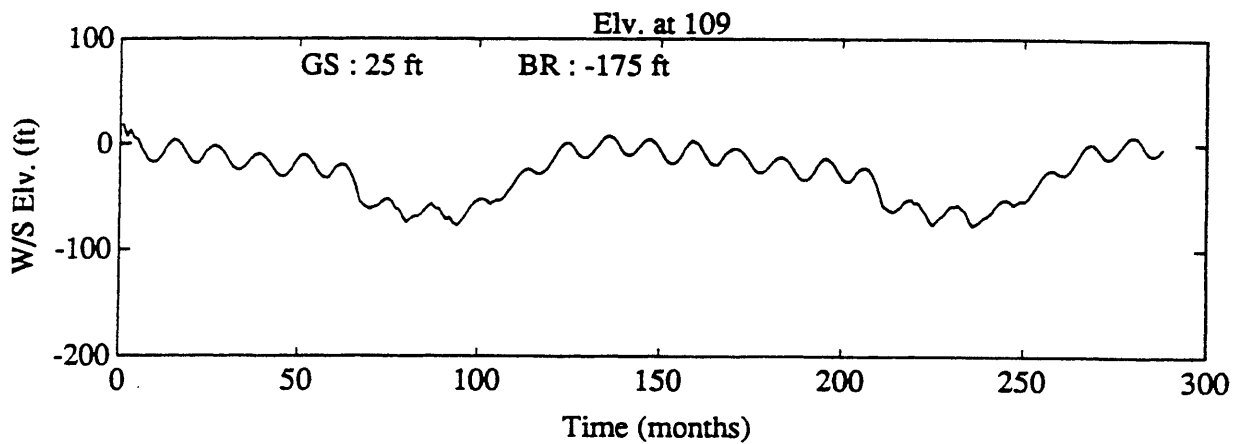
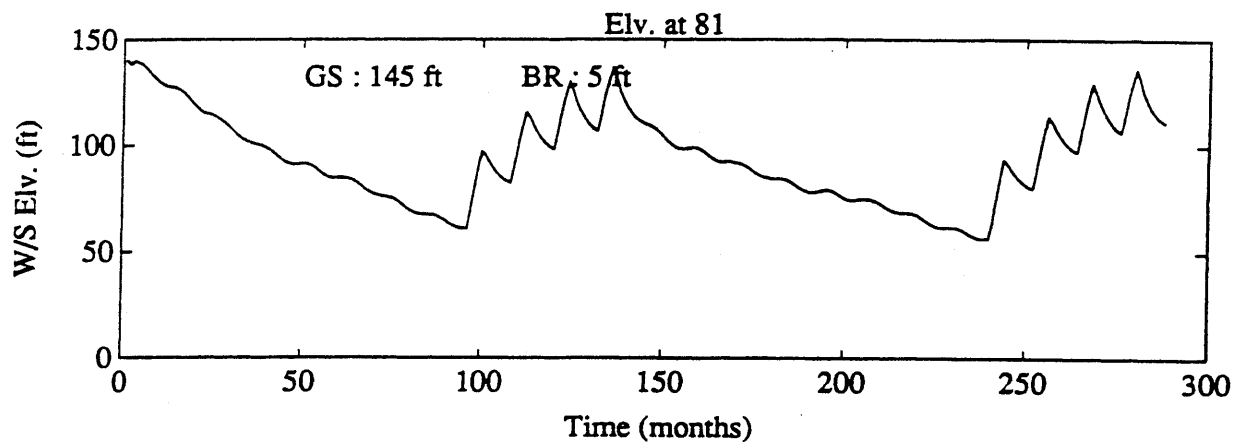
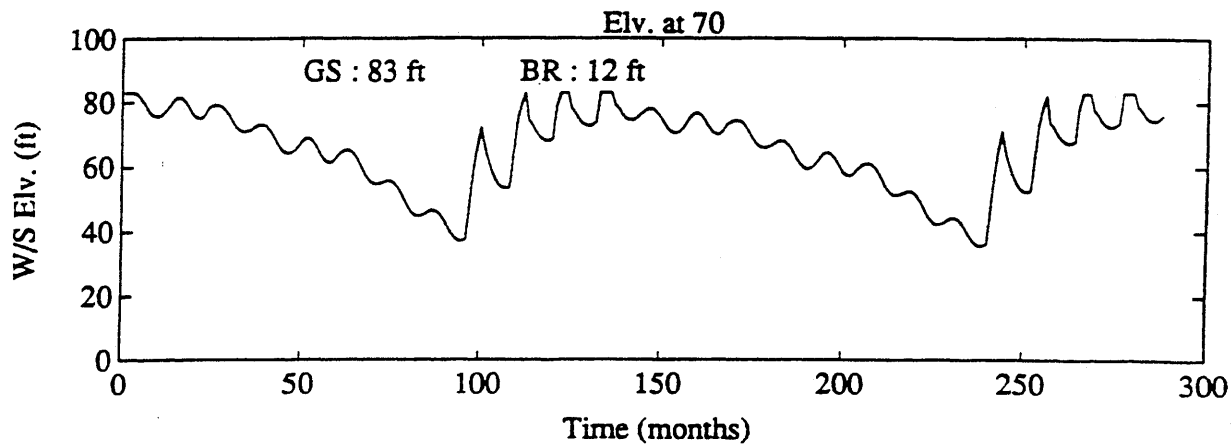


**PHASE II OPERATION
SIMULATED WATER LEVELS
AT SELECTED NODES**

See Figure 3-1 for node locations

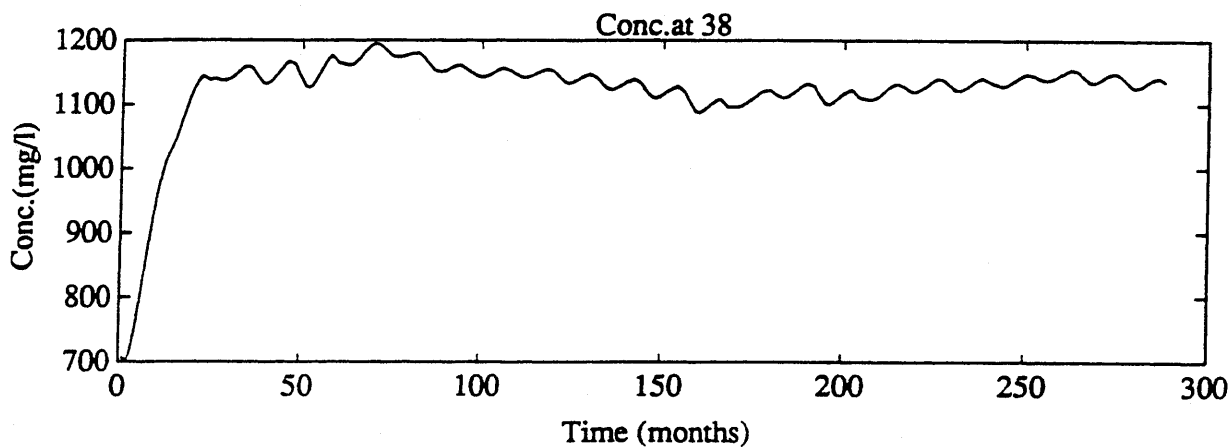
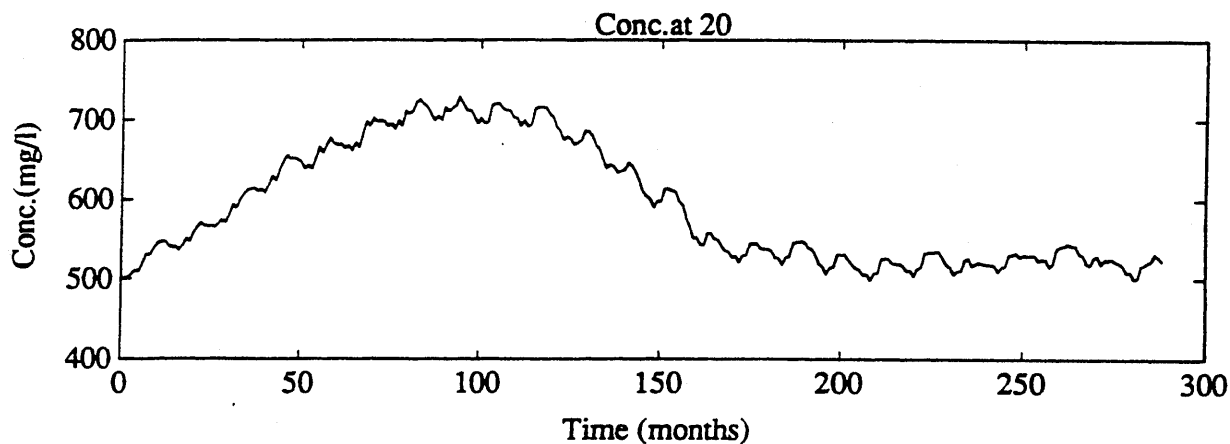
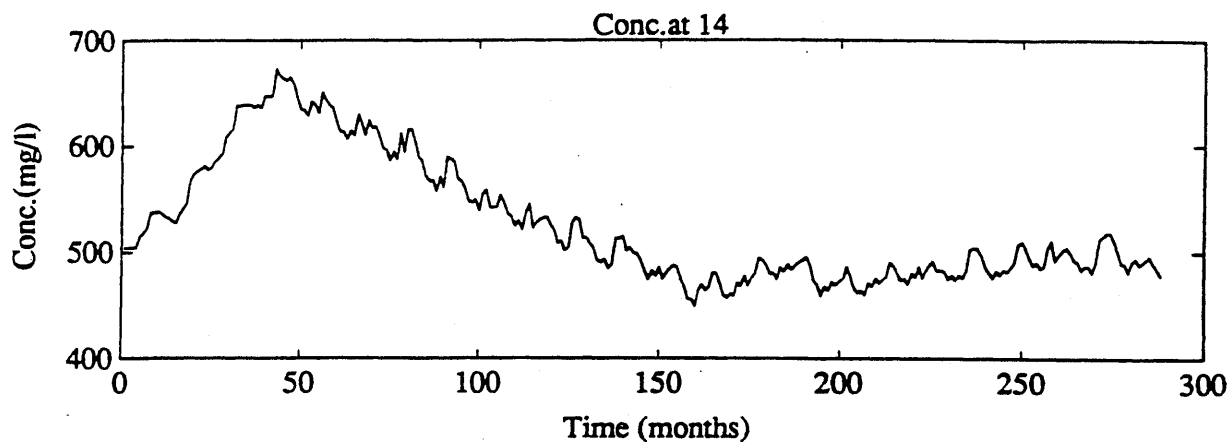
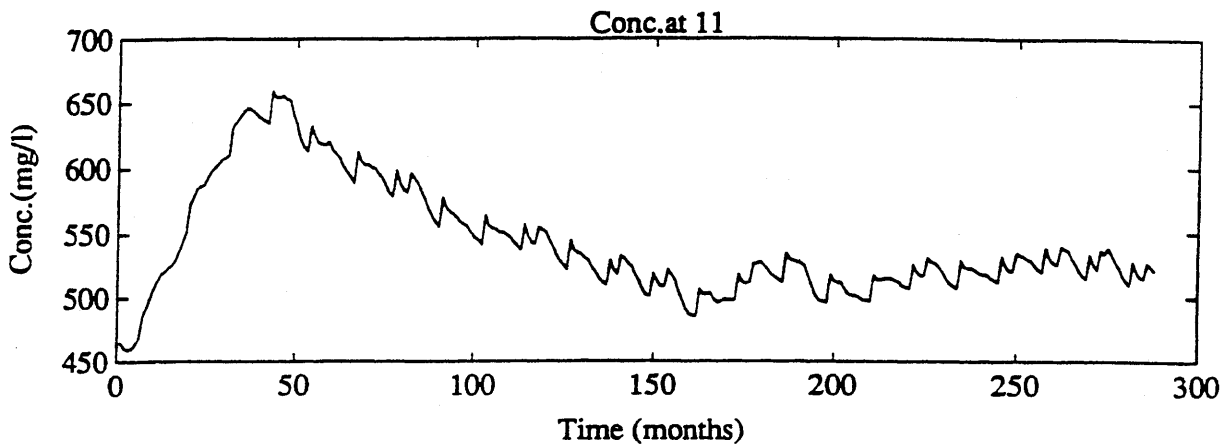


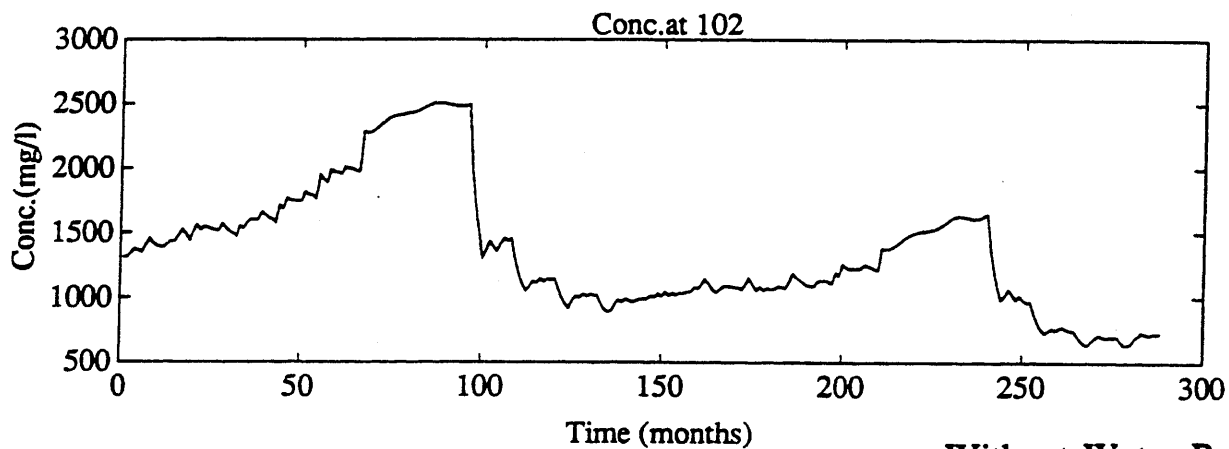
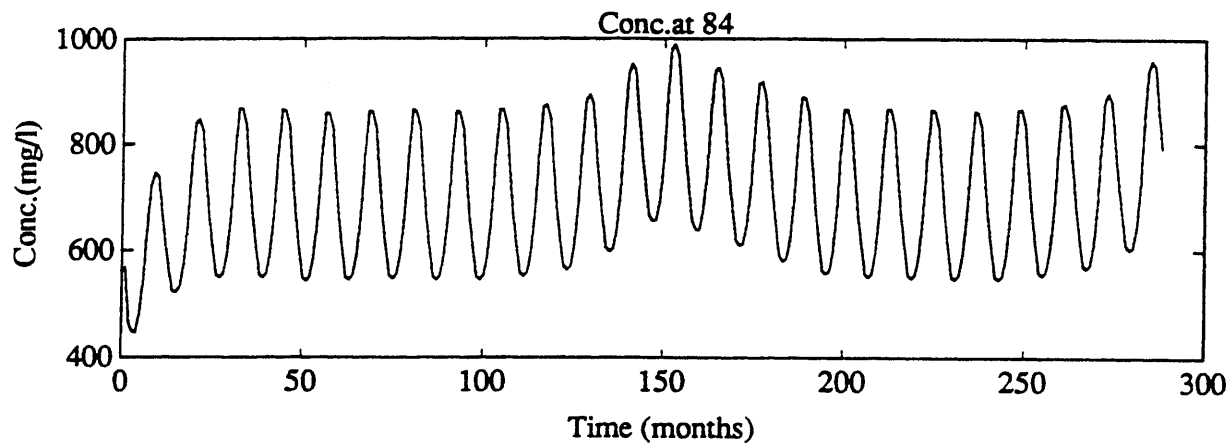
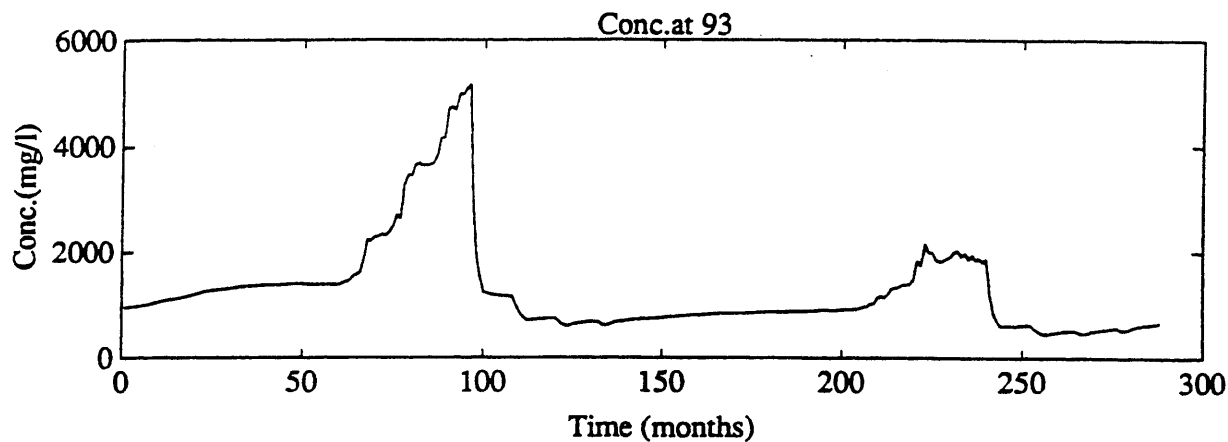
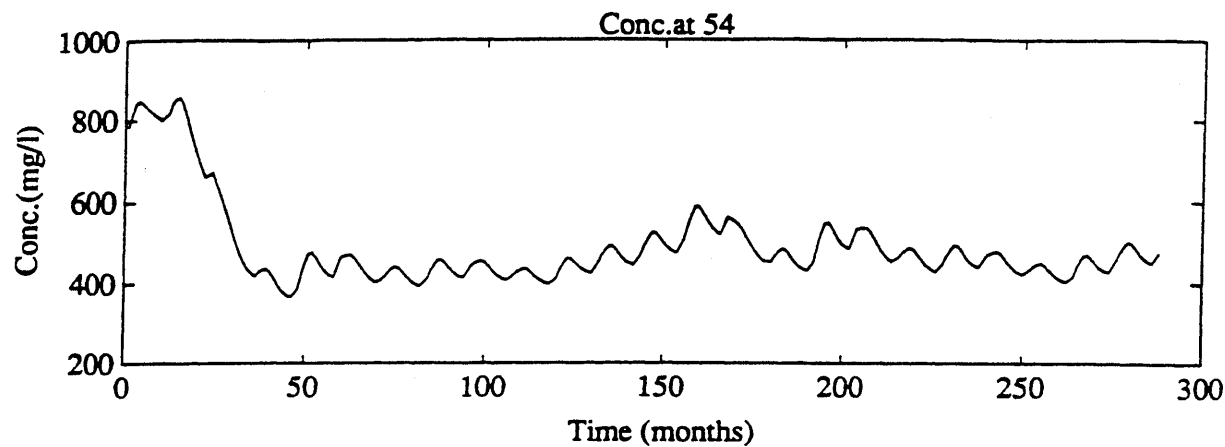




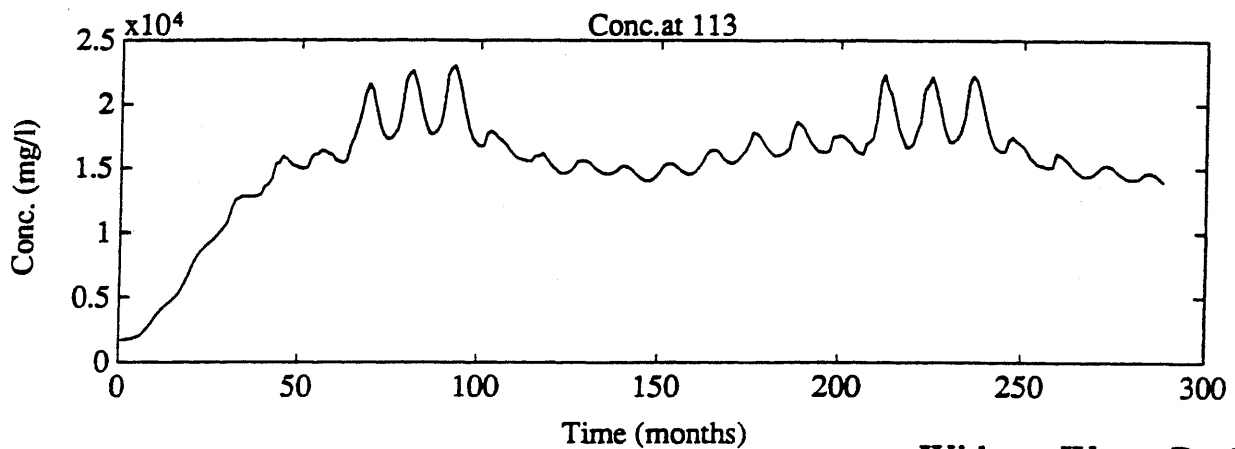
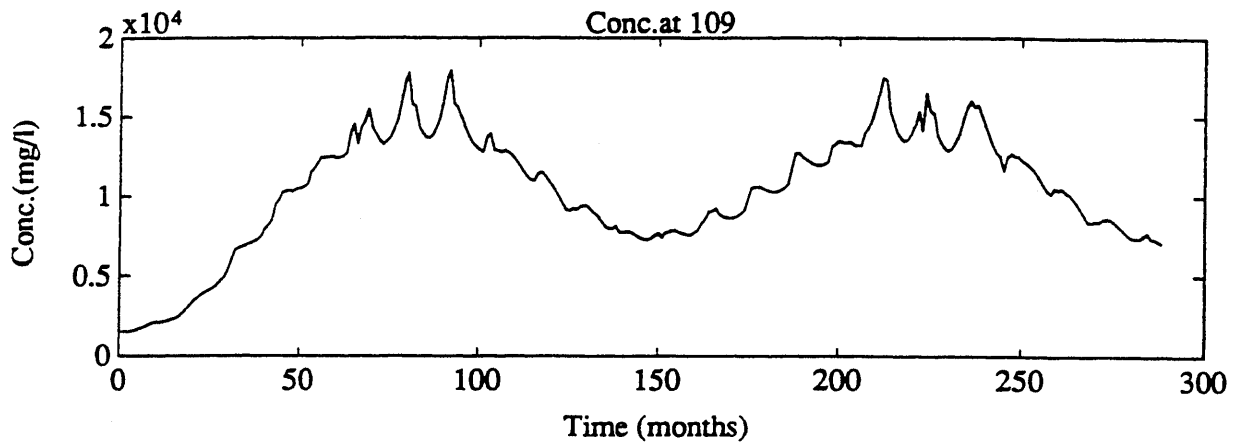
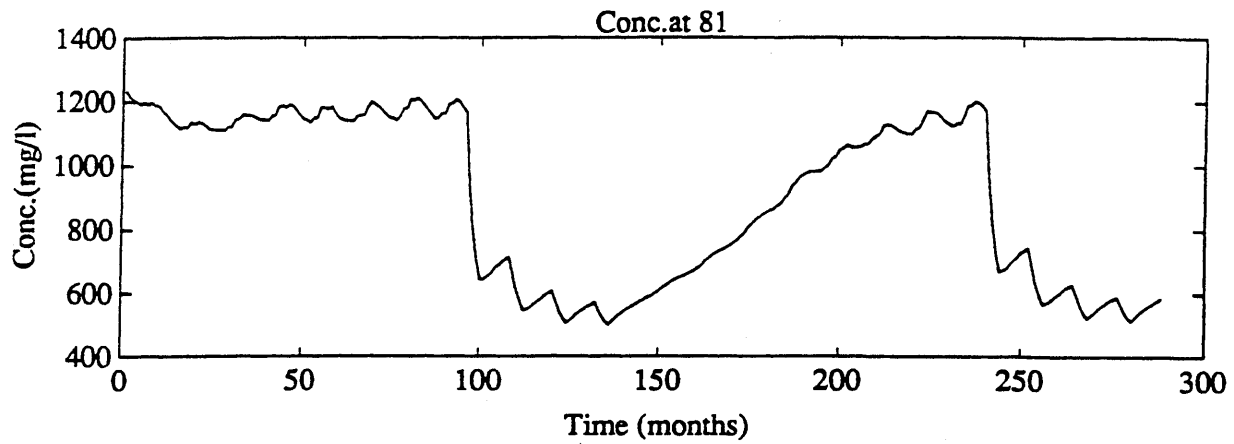
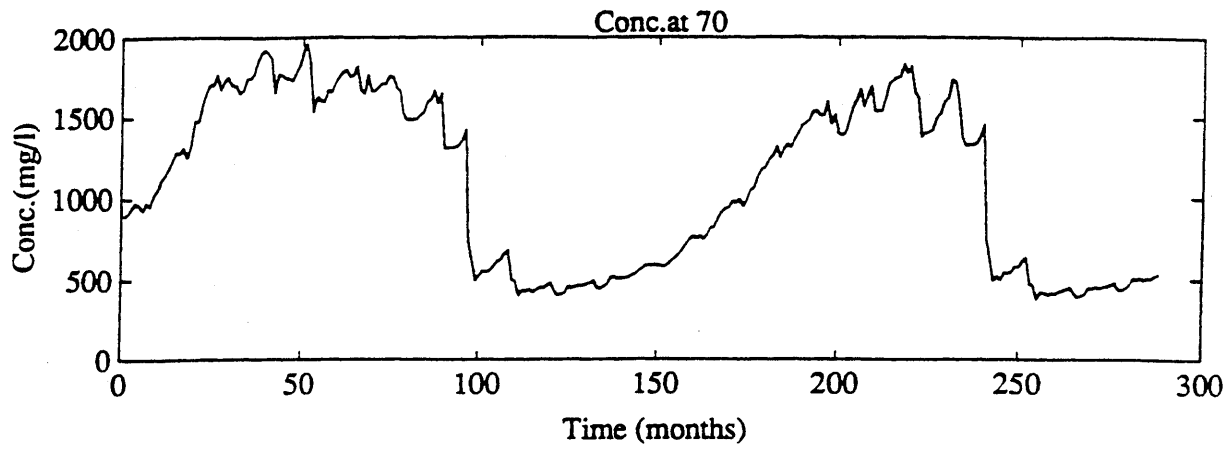
**PHASE II OPERATION
SIMULATED TDS CONCENTRATIONS
AT SELECTED NODES
WITHOUT RECLAMATION**

See Figure 3-1 for node locations





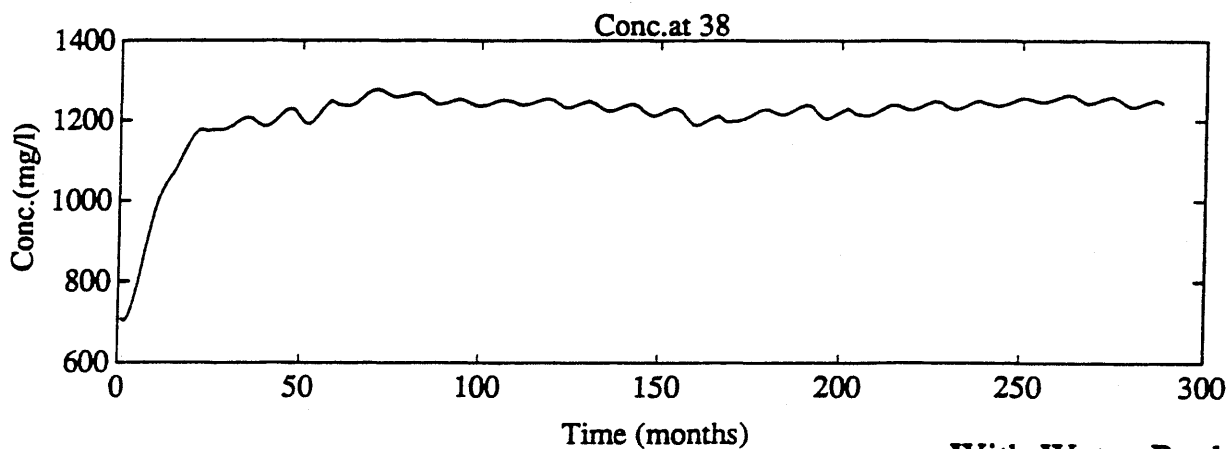
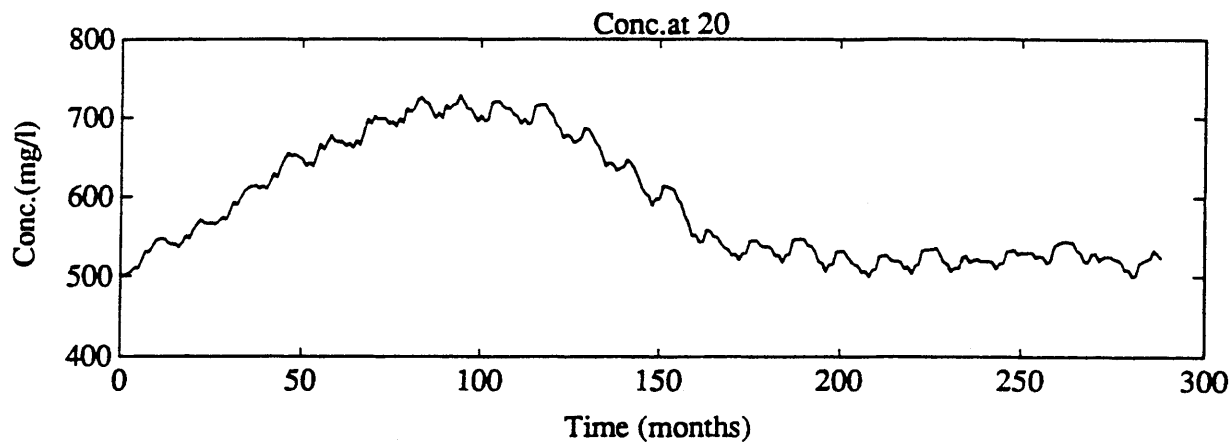
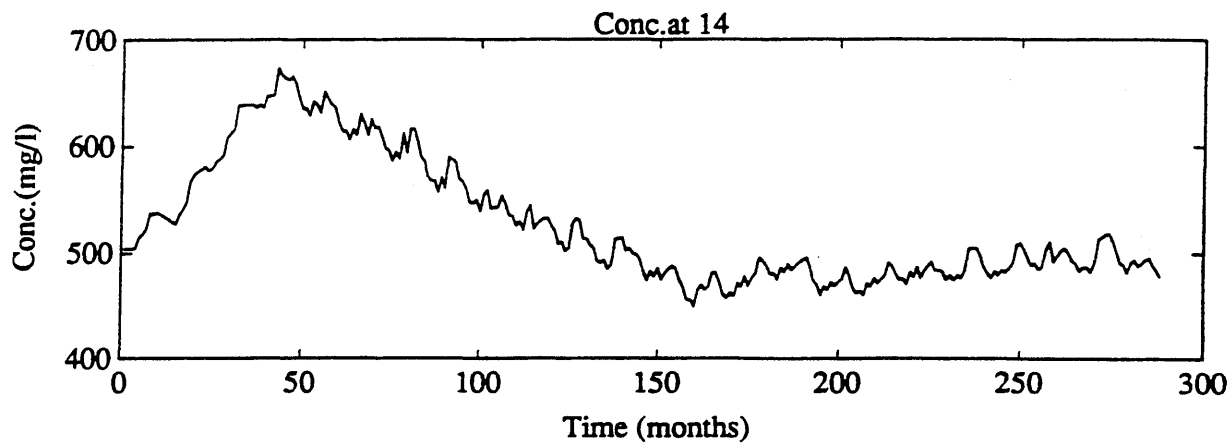
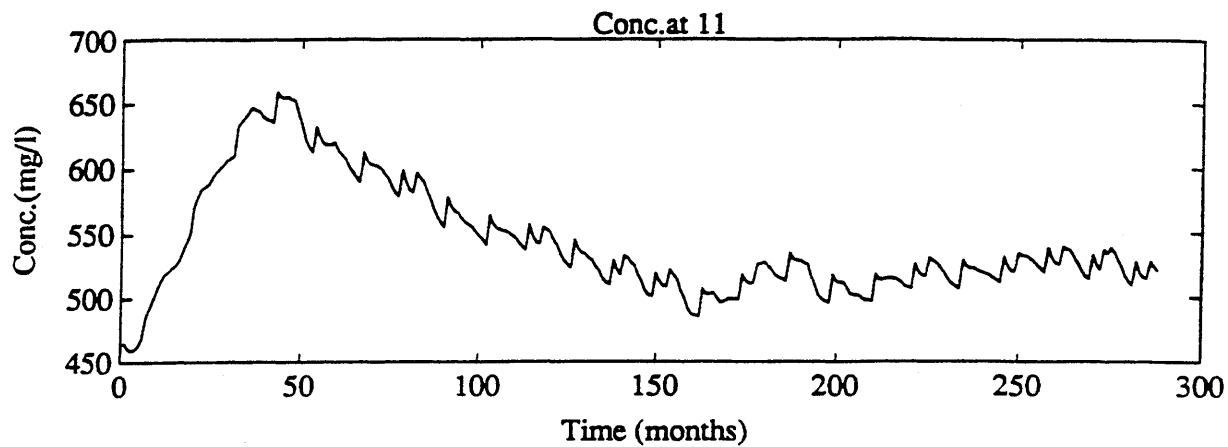
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Plus SJBA Phase II Project



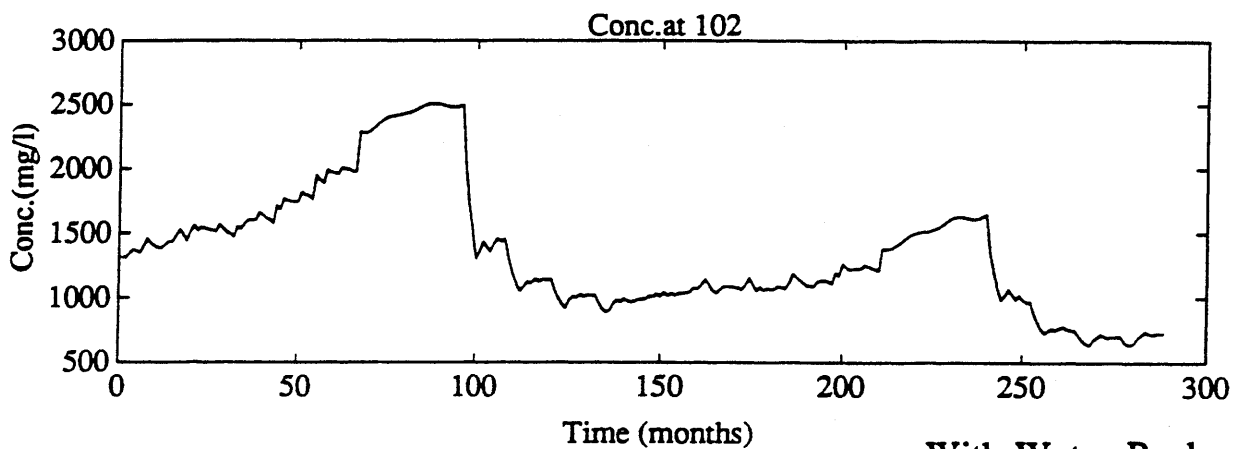
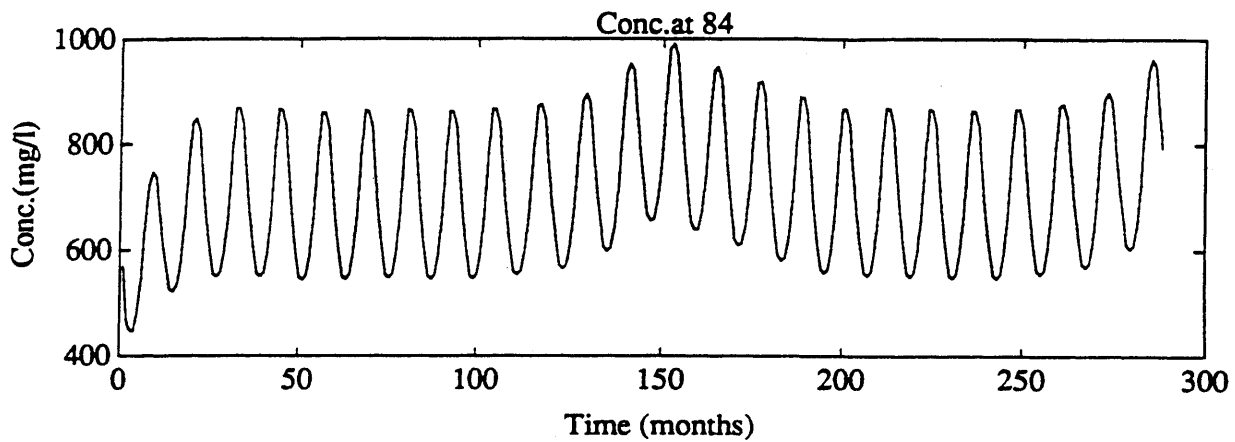
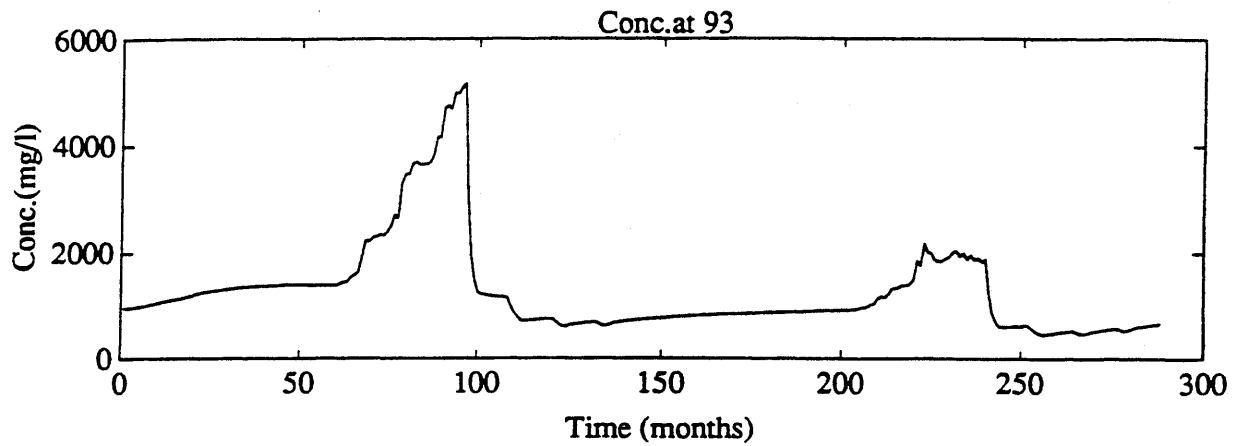
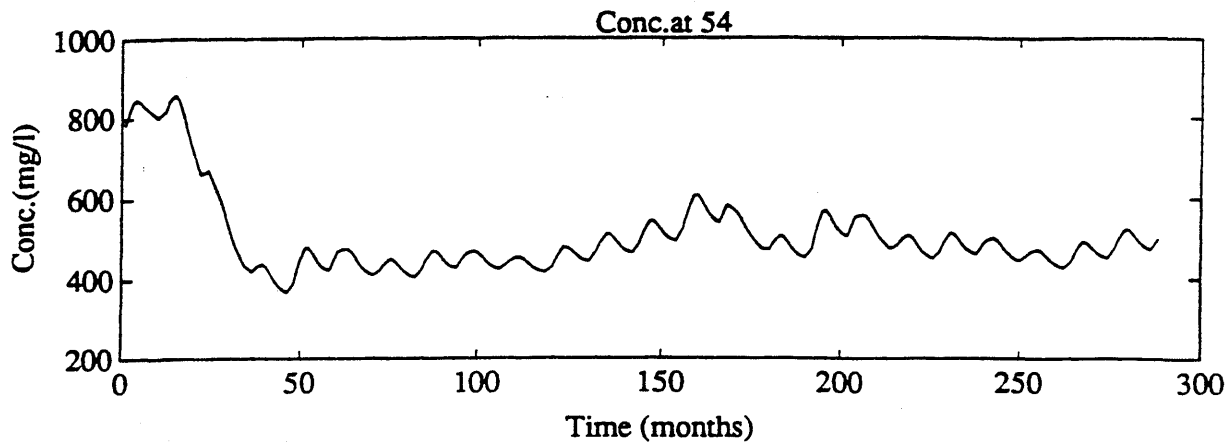
Without Water Reclamation
Plus SJBA Phase II Project

**PHASE II OPERATION
SIMULATED TDS CONCENTRATIONS
AT SELECTED NODES
WITH RECLAMATION**

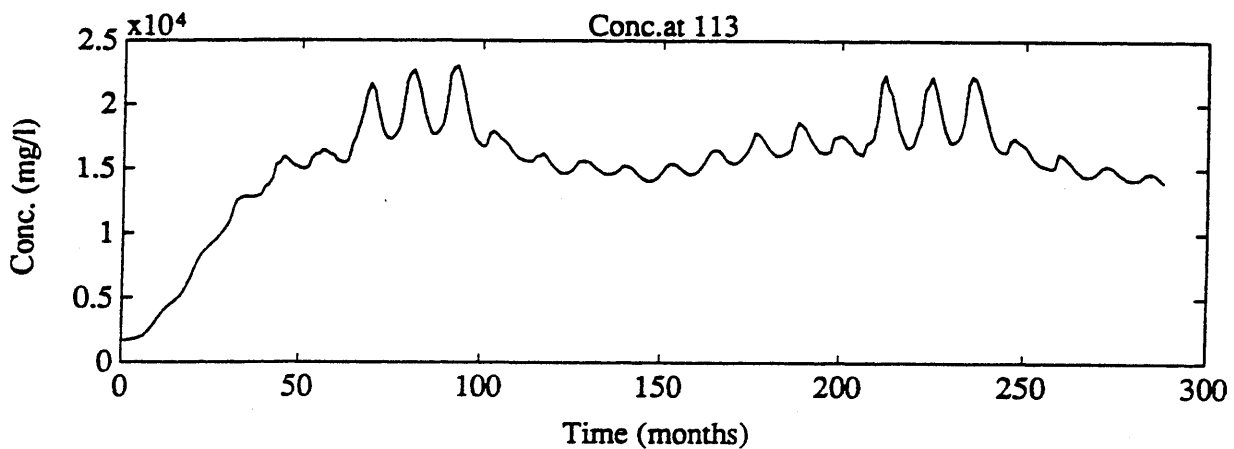
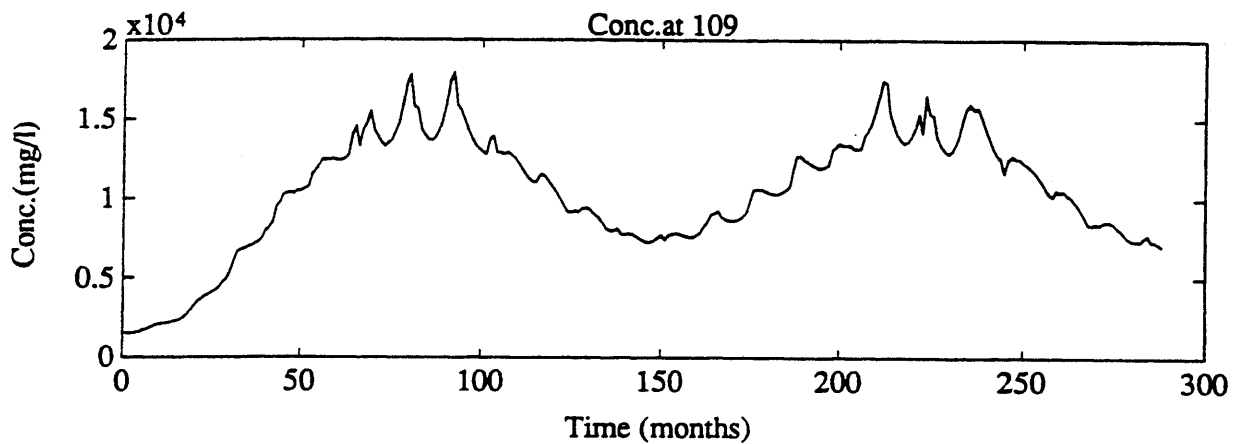
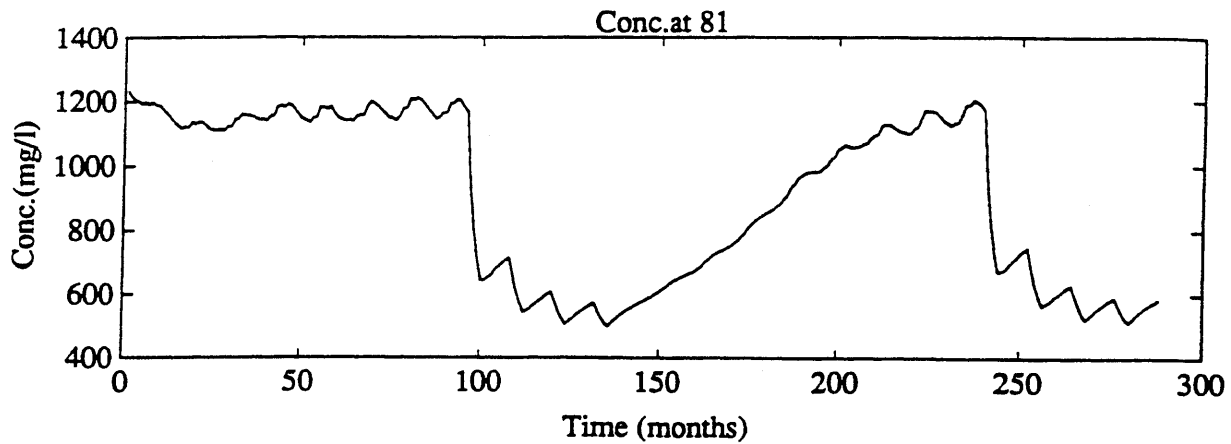
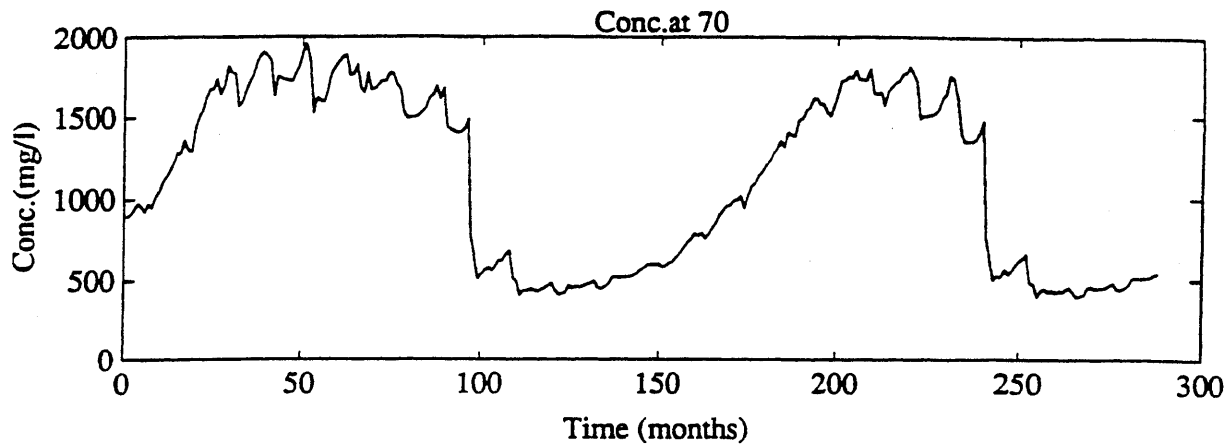
See Figure 3-1 for node locations



**With Water Reclamation
Plus SJBA Phase II Project**



With Water Reclamation
Plus SJBA Phase II Project



APPENDIX B

CONJUNCTIVE USE FACILITIES SITE EVALUATIONS

APPENDIX B

CONJUNCTIVE USE FACILITIES SITE EVALUATIONS

INTRODUCTION

The purpose of this section is to summarize the findings of the desalter facilities siting study within the San Juan Basin area. It involves a desalter plant siting in which five candidate sites are identified and selected for evaluation, wells siting which includes 17 potential sites and recharge basins siting which resulted in the selection of six potential sites.

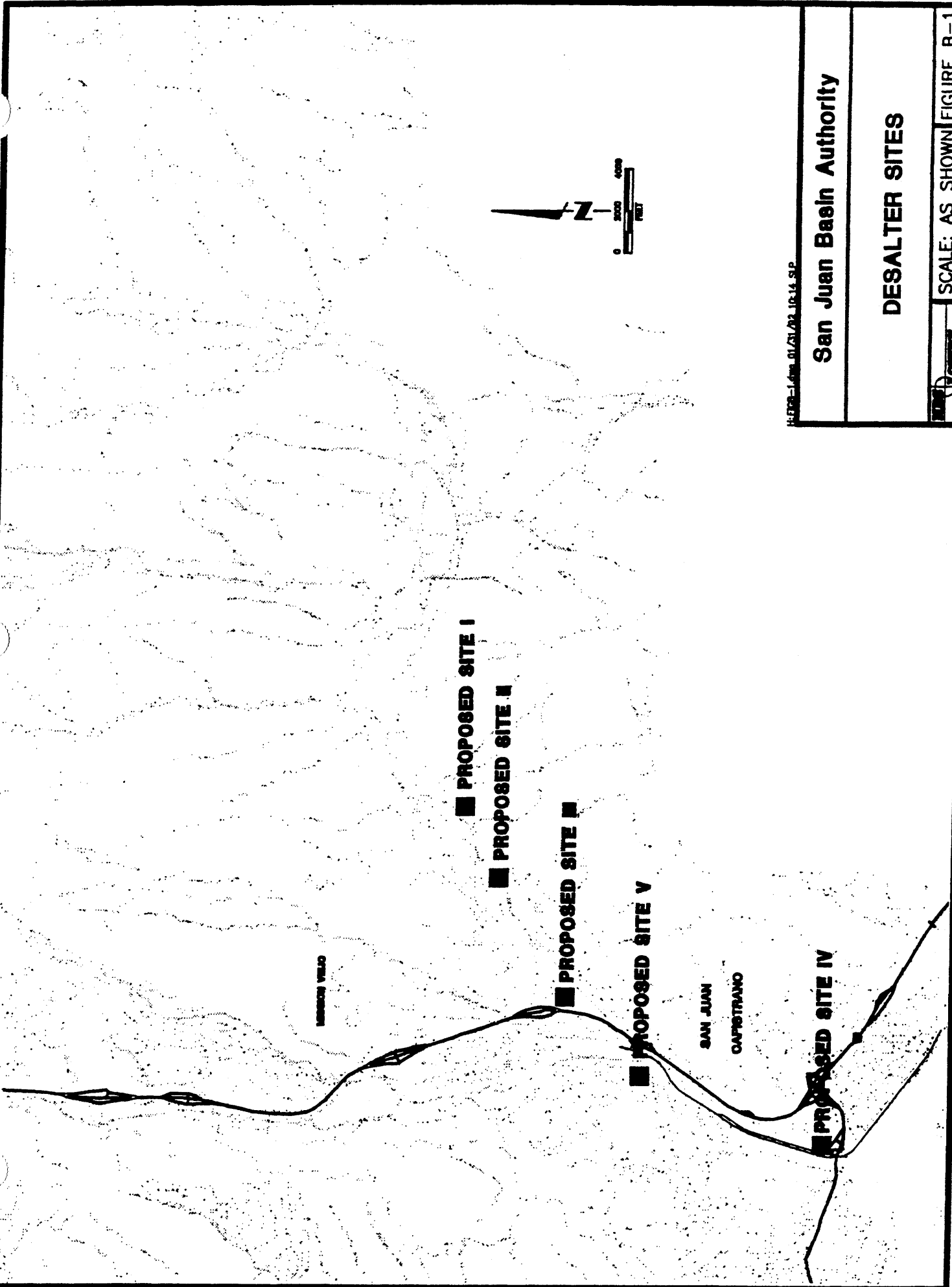
These potential sites were identified based on visual inspection of the area. Review of the ownership records in the County Recorder's office indicated that some of the potential sites were listed as publicly owned, others owned by private parties. Land use, land ownership and parcel size for all the potential sites are documented and included at the end of this section. Each of the desalter sites identified is rated with reference to each of the criteria described in subsequent paragraphs. Those sites are shown in Figure B-1. The locations of San Juan Creek as well as the existing Chiquita land outfall are also depicted, Figure B-1.

A recommendation of the best alternative potential desalter site, as well as conceptual pipeline routing connecting the desalter plant with the proposed new wells, is also presented in this section and shown on Figure 5-1.

DESALTER SITES' LAND OWNERSHIP AND LAND USE

A summary of land ownership, land use and parcel size for the selected desalter sites is presented in Table B-1.

The ownership of the identified sites as well as the land use and zoning were verified based on data collected from the County of Orange and the City of San Juan Capistrano. Figures B-2 through B-6, as well as Tables B-3 through B-7, identify location and land ownership of the five selected desalter sites along with their adjacent parcels.



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| | |
|--------------------------|-----------------|
| San Juan Basin Authority | |
| DESALTER SITES | |
| FIGURE B-1 | SCALE: AS SHOWN |
| FIGURE B-1 | |

TABLE B-1
POTENTIAL DESALTER SITES

| Desalter Site No. | Parcel Size (acres) | Current Land Use | Current Ownership |
|-------------------|---------------------|---|---|
| I | 118.58 | Very Low Density/ Open Space 1 du/ac max. | Santa Margarita Co. % Viejo Management Co. P.O. Box 9 San Juan Capistrano, CA 92693 |
| II | 6.367 | General Open Space | Creskide Equestrian Ltd. 27252 Cable Arroyo San Juan Capistrano, CA 92675 |
| III | 10.826 | Industrial Park | Real Estate Holdings, Inc. Newco. Mgmt. Co. 6320 Canoga Ave., Ste. 1430 Woodland Hills, CA 91367 |
| IV | 4.14 | Industrial | Capistrano Beach Sanitary Dist. P. O. Box 2008 Capistrano Beach, CA 92624 |
| V | 1.49 | Mobile Home Park 8 du's/ac. max. | CVWD P. O. Box 967 San Juan Capistrano, CA 92675 |
| | 7.40 | Spec. Study Area R. V. Storage | Forster, Thomas A TR P. O. Box 146 San Juan Capistrano, CA 92692 |

DESALTER SITING CRITERIA

Sites were identified and chosen to satisfy a siting criteria for best desalter site location.

The basis for identifying potential desalter sites was established and summarized as follows:

- Pipeline Constraints: Refers to a site being close to a point of connection to deliver desalted product water into the potable water distribution system.
- Land Availability: Refers to a site being located on a parcel or parcels of land that are large enough to handle the facility (approximately 2 acres). Also refers to the potential ease to deal with a land owner to acquire the land for the facility.

- **Flood Constraints:** Refers to the site being located in or out of a flood plain as shown on Federal Emergency Management Association (FEMA) maps.
- **Brine Disposal:** Refers to the ease of construction of a pipeline to dispose of brine into the nearest viable land outfall pipeline (costs, land right-of-way considered).
- **Public Impact:** Refers to how a facility is located to lessen the effect on the public with respect to noise, traffic and visual considerations.
- **Minimize Sitework:** Refers to how a site rates with respect to the need to develop the finished grades for the facility (minimizing cut and fill).
- **Site Accessibility:** Refers to how readily accessible the site is to public roads, thereby minimizing costs to develop access roads and/or improvements to the facility.
- **Power and Sewer Availability:** Refers to how a site rates with respect to the ability to bring power and to hook up sewer to a desalter facility (costs and constructibility considered).
- **Proximity to Well Field:** Refers to how a site is located with respect to well field to allow the desalter system as a whole take advantage of elevations to reduce pumping costs.
- **Institutional Constraints:** Refers to how a site with a desalter facility will be impacted by regulatory agencies.

DESALTER SITE RATING

The selected potential desalter sites are located in the City of San Juan Capistrano and in unincorporated areas of Orange County. Each site has been carefully examined. Sites were rated as "excellent", "good", "fair" or "poor" with regard to the siting criteria established earlier. Table B-7 identifies each site and its rating relative to the other sites. The site description, as well as distinguishing features that contribute to the selection and rating of the site, is summarized in subsequent sections.

Site I - La Pata

- o Site is located in a large parcel about 118 acres.
- o Site is privately owned. This could create a problem as far as land availability is concerned.
- o The site is located outside the flood plain shown on the FEMA maps.
- o Desalted product water can be distributed into CVWD upper zone system due to new pipelines to be constructed in the area.
- o Brine disposal can easily be realized due to close proximity to Chiquita Land outfall line that passes adjacent to the site.

- o Site is located in area zoned for low residential, which currently has residential development to the west of the site. Visual and noise impacts will need to be mitigated.
- o Site work is at a minimal level. Finished grade can easily be developed due to the flat nature of this particular site.
- o The site can be accessed by extending San Juan Creek Road. An Edison easement would be crossed with this extension of the road.
- o Power is obtainable from SDG&E.
- o Site is located at an elevation that contributes to the reduction in costs of pumping. This is due to the fact that product water can be distributed into district water system (upper zone) through future pipelines.
- o On the negative side, raw water from the field wells has to be pumped up through a long raw water supply pipeline to the desalter plant site at a higher elevation, thus increasing pumpage cost.
- o The site is located outside the City limit and within the County; this minimizes the institutional and regulatory constraints.

Site II - Camino Lacouague

- o Site is located adjacent to a residential development area along San Juan Creek Road. It is zoned for general open space. To the south of this site is a proposed public park. To obtain the land for this type of facility would be difficult from a regulatory viewpoint.
- o The site is within a 1- to 3-foot flood plain zone.
- o Desalted product water can be distributed into the CVWD upper zone system.
- o Site location is ideal for brine disposal since the land outfall passes in San Juan Creek Road adjacent to the site.
- o Public impact is not favorable since it is located in a residential area as well as adjacent to a public park. Noise and visual impacts would require mitigation.
- o Site work will require floodproofing, possibly raising finished grades due to the site being within a FEMA flood area.
- o Site is readily accessible since it lies immediately north of San Juan Creek Road.
- o Power can be brought to this site by SDG&E. Sewer mains exist within San Juan Creek Road.
- o Raw water from field wells has to be pumped through a long pipeline to this site.

- o This site is located within the City near residential and park land. Also the land is zoned open space. Approvals from regulatory agencies would be difficult to obtain.

Site III - Paseo Tirador

- o Site is located adjacent to Interstate 5, Ortega Highway and San Juan Creek Road. Zoned as industrial, this site is an ideal location for a desalter facility.
- o Land availability could be an issue since more than one parcel would have to be purchased to handle the facility (about 2 acres). More than one owner would be included in the property acquisition.
- o Another site alternative, a 10.8-acre adjacent parcel zoned as industrial, would have to be subdivided into two parcels, one of which is to be used as a site. This is better since negotiations would only be with one owner.
- o Site is located in a 1- to 3-foot flood plain according to the FEMA maps. Floodproofing is required.
- o Product water can be distributed into the lower zone of the CVWD system.
- o Brine disposal can be achieved by the construction of a 1,000-foot pipeline across San Juan Creek and the connection to Chiquita land outfall in San Juan Creek Road. Creek crossings are difficult to get approved for construction from a regulatory point of view.
- o Public impact is minimal since this site is zoned industrial and is adjacent to the freeway. Noise and visual impacts would require less mitigation.
- o Site area is close to the San Juan Creek bed as well as a large storm drain outlet. Fill for finished grades would need to be elevated as floodproofing for a facility.
- o Site can be accessed by using Paseo Tirador Street.
- o Power can be made available by SDG&E. Sewer mains exists within close proximity to the site.
- o Site is in close proximity to the well fields. Reduction in cost of raw water pumpage is achieved due to lower elevations, and reduced piping.
- o Constraints related to institutional and regulatory agencies are low.

Site IV - CBSD

- o Site is zoned industrial and owned by Capistrano Beach Sanitary District. It can be located within an area of land that has 30 acres available. It is adjacent to the SERRA Wastewater Treatment Plant.
- o Site is located in a flood plain. Site would require floodproofing.

- o Distribution of desalted product water into the CVWD system is not favorably achieved due to the point of connection being owned by Tri-Cities Municipal Water District. Water paper trades could get complicated.
- o Brine disposal is ideal at this site location since it is very close to the SERRA ocean outfall.
- o Since this parcel along with the adjacent parcels is zoned industrial, as well as the closeness to the Serra plant and San Juan Creek Channel, public impact is at the low level. Noise and visual impacts would require less mitigation.
- o Sitework will require floodproofing, possibly raising finished grades by filling.
- o Site is not readily accessible to public roads; therefore access road improvement is required.
- o Power can be obtained from SDG&E.
- o Site is located in the lower San Juan Basin area, a far distance south of the well fields. Reduction in cost of raw water pumpage is achieved because of the lower elevation of the site relative to the well field elevations.
- o More piping is required due to the long raw water pipeline which will be constructed from the well fields to the site.
- o Institutional as well as regulatory constraints are minimal since positive feedback from General Manager of CBSD was obtained regarding the construction of a desalter plant in that location.

Site V - Forster

- o Site includes a small parcel about 1.49 acres adjacent to San Juan Creek flood control channel, owned by CVWD; remaining portion of site is owned by Thomas Forster.
- o Site is zoned as a Mobile Home Park and R.V. storage area.
- o Site is located within a 1-foot flood plain zone according to FEMA maps. Floodproofing is required.
- o Desalted product water can be distributed into CVWD lower zone system. Site is adjacent to 12-inch water pipeline.
- o Brine disposal can be achieved by the construction of an approximately 300-foot pipeline across San Juan Creek and the connection to Chiquita Land Outfall in San Juan Creek Road.
- o Site is located adjacent to residential area (density 8 DU's/AC); therefore public impact is high. Noise as well as visual impacts would require appropriate mitigation.
- o Site work will require floodproofing, possibly raising finished grades.

- o Site can be accessed by using a dirt road off Alipaz Street. Road improvement is required.
- o Power is obtainable from SDG&E. Sewer mains are adjacent to the site.
- o Site is located at a short distance from the well fields. Cost of raw water pumpage as well as piping is minimal.
- o Constraints related to institutional and regulatory agencies are low.

DISCUSSION AND DESALTER SITE RECOMMENDATION

Five potential desalter sites were identified to meet the siting criteria established earlier. These sites were rated and evaluated earlier in this section based on their environmental, economic and feasibility aspects. Using the rating criteria for each location, the five sites, shown on Table B-2, have an overall rating as follows:

La Pata - Site 1 - Fair
 Camino Lacouague - Site II - Fair
 Paseo Tirador - Site III - Good
 CBSD - Site IV - Fair
 Forster - Site V - Good

It is recommended that the desalter plant be located on Site III or V. These two sites will require further investigation to identify their overall suitability for construction of the desalter plant. The owners of Site V have expressed interest in negotiating with the SJBA. It is recommended that negotiations commence as soon as possible. Figure B-2 illustrates conceptually the desalter plant at this site as well as approximate acreage requirements.

WELLS AND PIPELINES

New potential well sites are identified based on their proximity to the center of the basin, land use, availability of the site parcel and accessibility. Wells are spaced to account for an anticipated maximum radius of influence of about 1,500 feet for each well. Table B-8 presents land ownership, land use and size for the well sites.

A well collection system will be constructed to convey well water to the desalter. A conceptual well water collection system is shown on Figure 5-1. The collection pipelines are proposed to be constructed in existing roads.

Potential recharge basins are identified and chosen based on land use, location and availability, Figure 5-1. Table B-9 presents land ownership, land use and site size for the recharge basin sites. Hydrogeological studies will need to be completed before the feasibility of using the proposed recharge site can be determined.

TABLE B-2
SAN JUAN BASIN
DESALTER SITE RATING

| Site | Site No. | Pipeline Constraints | Land Availability | Flood Constraints | Brine Disposal | Public Impact | Minimize Sitework | Site Accessibility | Power Sewer Availability | Proximity To Well Field | Institutional Constraints | Total Rating |
|------------------|----------|----------------------|-------------------|-------------------|----------------|---------------|-------------------|--------------------|--------------------------|-------------------------|---------------------------|--------------|
| La Pata | I | 4 | 2 | 4 | 4 | 3 | 4 | 2 | 3 | 1 | 3 | 30 |
| Camino Lacouague | II | 3 | 1 | 2 | 4 | 2 | 3 | 4 | 3 | 2 | 1 | 25 |
| Paseo Tirador | III | 3 | 3 | 2 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 32 |
| CBSD | IV | 2 | 4 | 2 | 4 | 4 | 3 | 2 | 3 | 3 | 1 | 28 |
| Forster | V | 4 | 4 | 2 | 4 | 2 | 3 | 3 | 3 | 4 | 3 | 32 |

Notes:

E = Excellent highly recommended = 4

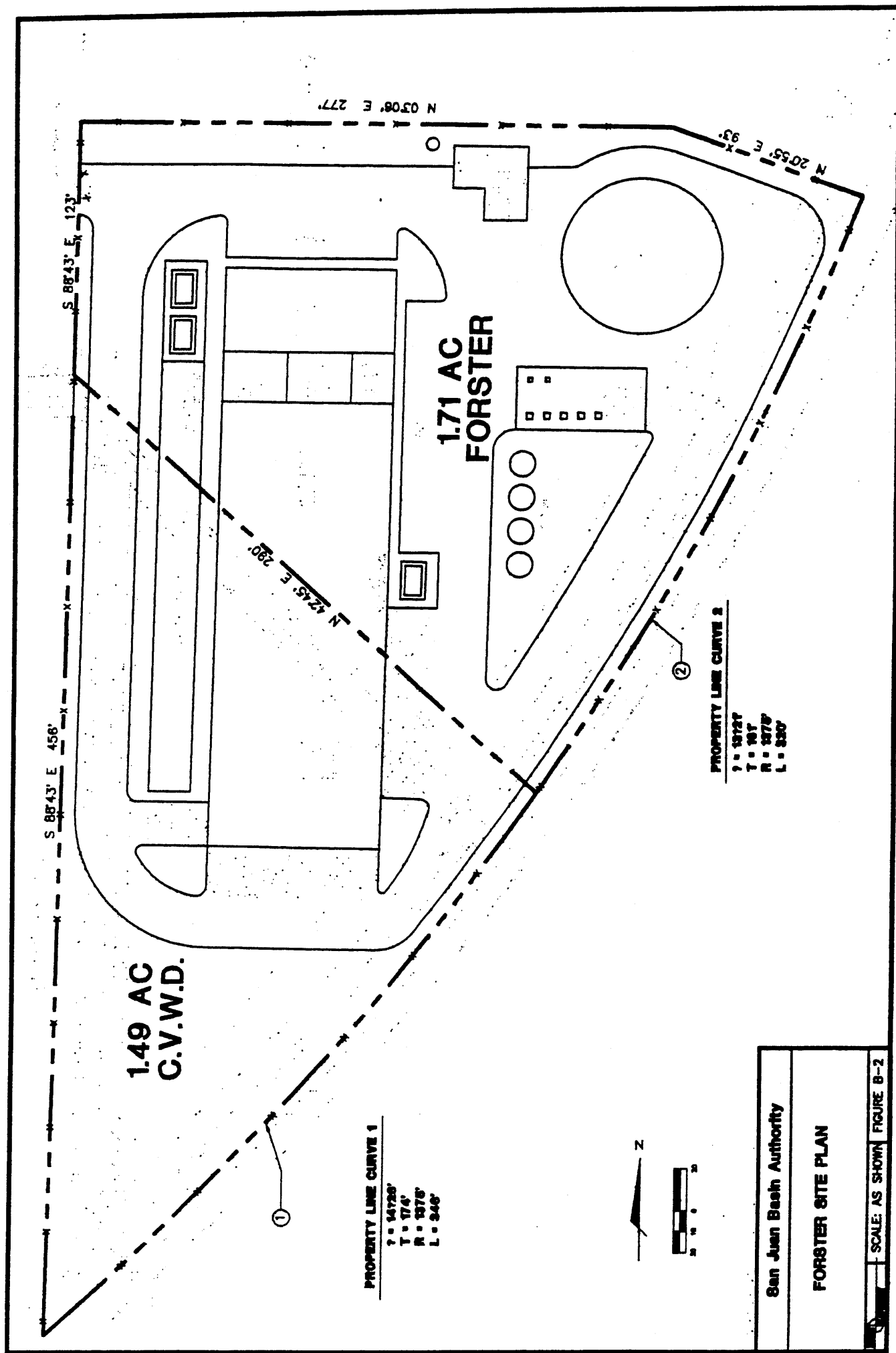
G = Good recommended = 3

F = fair acceptable = 2

P = Poor not recommended = 1

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Brine Disposal Pipeline

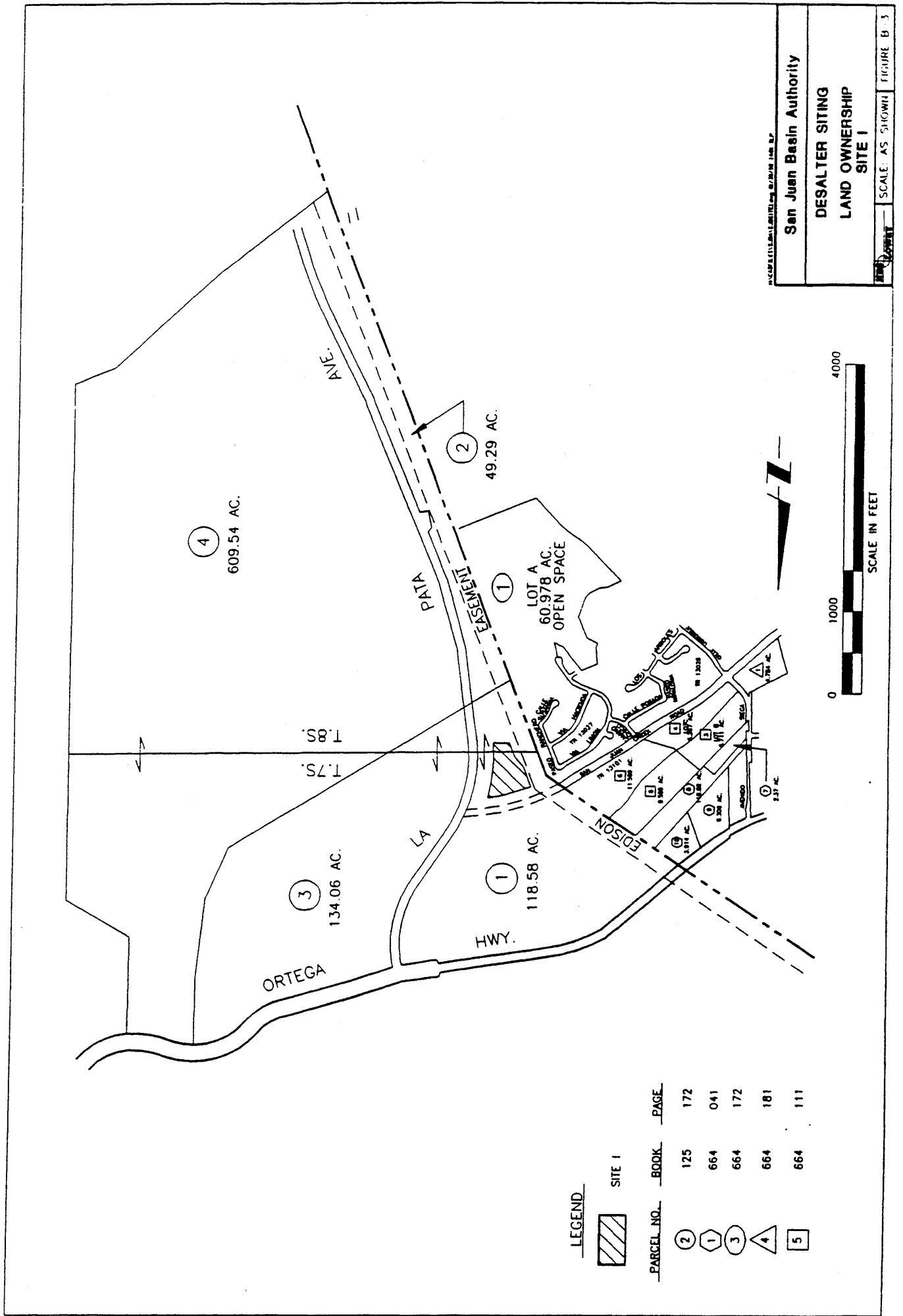
Reclamation of the saline groundwater will produce a brine waste stream. A brine disposal pipeline will transport waste flows from the desalter site to the existing Chiquita land outfall pipeline, adjacent to San Juan Creek.

Product Water Pipeline

The product water pipeline will be constructed having the capacity to carry the maximum capacity of the desalter. The best proposed route for this pipeline is through San Juan Creek Road running parallel to the existing Chiquita Wastewater Treatment Plant land outfall. It will be connected to the upper zone of the Capistrano Valley Water District water system at a PRV location adjacent to La Pata and Ortega Highway and ultimately connected to the South County Pipeline at Chiquita Canyon.

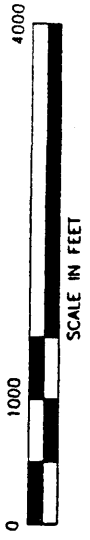
LAND USE

LAND OWNERSHIP



LEGEND

| PARCEL NO. | BOOK | PAGE |
|------------|------|------|
| 2 | 125 | 172 |
| 1 | 664 | 041 |
| 3 | 664 | 172 |
| 4 | 664 | 181 |
| 5 | 664 | 111 |



San Juan Basin Authority

DESALTER SITING
LAND OWNERSHIP
SITE 1

**TABLE B-3
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #1 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|---------------------|-----------------|---|---|
| 125-172-01 SITE 1 | 01 | 118.58 | VERY LOW DENSITY 1 DU'S/AC MAX. OPEN SPACE | SANTA MARGARITA COMPANY VIEJO MANAGEMENT CO P O BOX 9 SAN JUAN CAPISTRANO, CA. 92693 RECDR DOC # 83/000462887 |
| 125-172-03 | 03 | 134.06 | VERY LOW DENSITY 1 DU'S/AC MAX. | SANTA MARGARITA COMPANY VIEJO MANAGEMENT CO P O BOX 9 SAN JUAN CAPISTRANO CA. 92693 RECDR DOC # 83/000462887 |
| 125-172-04 | 04 | 609.54 | VERY LOW DENSITY 1 DU'S/AC MAX. GENERAL OPEN SPACE | SAN JUAN PARTNERSHIP # 4 VIEJO MANAGEMENT CO P O BOX 9 SAN JUAN CAPISTRANO, CA 92693 RECDR DOC # 014343/00607 |
| 125-172-02 | 02 | 49.29 | VERY LOW DENSITY 1 DU'S/AC MAX. | SAN JUAN PARTNERSHIP # 4 VIEJO MANAGEMENT CO P O BOX 9 SAN JUAN CAPISTRANO, CA 92693 RECDR DOC # 014343/00607 |
| 664-172-01 | 01 LOT A | 60.978 | VERY LOW DENSITY 1 DU'S/AC MAX. | CITY OF SAN JUAN CAPISTRANO 32400 PASEO ADELANTO SAN JUAN CAPISTRANO, CA 92675 |
| 664-111-03 | 03 LOT B | 6.711 | GENERAL OPEN SPACE SAN JUAN CREEK | CITY OF SAN JUAN CAPISTRANO ATTN CITY ATTY 32400 PASEO ADELANTO |
| 664-111-04 | 04 LOT C | 6.367 | GENERAL OPEN SPACE | SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 88/445030 CREEKSIDE EQUESTRIAN LTD 27252 CALLE ARROYO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 87/000664846 |
| 664-111-05 | 05 | 9.589 | GENERAL OPEN SPACE SAN JUAN CREEK | CITY OF SAN JUAN CAPISTRANO ATTN CITY ATTY 32400 PASEO ADELANTO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 88/445030 |
| 664-111-06 | 06 | 11.559 | GENERAL OPEN SPACE | CREEKSIDE EQUESTRIAN LTD 27252 CALLE ARROYO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 87/000664846 |
| 664-041-08 | 08 | 7.64 | GENERAL OPEN SPACE | ANDERSON, KERRI JO TR 610 NEWPORT CENTER DR STE 690 NEWPORT BEACH, CA 92660 RECDR DOC # 89/307661 |

**TABLE B-3
(CONTINUED)
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING**

SITE #1 AND ADJACENT PARCELS

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|---------------------|-----------------|-------------------------------|---|
| 664-041-09 | 09 | 6.306 | MEDIUM-LOW 3.5 DU'S/AC MAX | CLARKE, ATHALIE R TR 61 BELCOURT RD NORTH NEWPORT BEACH, CA 92660 RECDR DOC # 86/000427856 |
| 664-041-10 | 10 | 3.914 | MEDIUM-LOW 3.5 DU'S/AC MAX | ANDERSON, KERRI JO TR SUITE 690 610 NEWPORT CENTER DR NEWPORT BEACH, CA 92660 RECDR DOC # 89/307660 |



SITE I

View from La Pata Avenue towards the West

**TABLE B-4
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING**

SITE #2 AND ADJACENT PARCELS

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|---|--|
| 664-111-06 | 06 | 11.559 | GENERAL OPEN SPACE | CREEKSIDE EQUESTRIAN LTD 27252 CALLE ARROYO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 87/000664846 |
| 664-111-05 | 05 | 9.589 | GENERAL OPEN SPACE | CITY OF SAN JUAN CAPISTRANO ATTN CITY ATTY 32400 PASEO ADELANTO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 88/445030 |
| 664-111-04 SITE 2 | 04 | 6.367 | GENERAL OPEN SPACE | CREEKSIDE EQUESTRIAN LTD 27252 CALLE ARROYO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 87/000664846 |
| 664-111-03 | 03 | 6.711 | GENERAL OPEN SPACE SAN JUAN CREEK | CITY OF SAN JUAN CAPISTRANO ATTN CITY ATTY 32400 PASEO ADELANTO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 88/445030 |
| 664-181-01 | 01 | 4.784 | OPEN SPACE PUBLIC PARK SITE | CITY OF SAN JUAN CAPISTRANO 32400 PASEO ADELANTO SAN JUAN CAPISTRANO, CA 92675 |
| 664-041-07 | 07 | 2.37 | GENERAL OPEN SPACE | ANDERSON DERRI JO IR MICHAEL, J CHRISTIANSON 610 NEWPORT CENTER DR STE 690 NEWPORT BEACH, CA 92660 RECDR DOC # 89/307662 |
| 664-041-08 | 08 | 7.64 | GENERAL OPEN SPACE | ANDERSON DERRI JO IR 610 NEWPORT CENTER DR STE 690 NEWPORT BEACH, CA 92660 RECDR DOC # 89/307661 |
| 664-041-09 | 09 | 6.306 | MEDIUM-LOW 3.5 DU'S/AC MAX | CLARKE, ATHALIE R TR 61 BELCOURT RD NORTH NEWPORT BEACH, CA 92660 RECDR DOC # 86/000427856 |
| 664-041-10 | 10 | 3.914 | MEDIUM-LOW 3.5 DU'S/AC MAX | ANDERSON DERRI JO IR 610 NEWPORT CENTER DR STE 690 NEWPORT BEACH, CA 92660 RECDR DOC # 89/307660 |



SITE II

Future equestrian center - View towards the
Southwest - San Juan Creek Road shown on left

**TABLE B-5
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #3 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|-----------------|---|
| 666-131-12 | 12 | 9.864 | INDUSTRIAL PARK | CAPISTRANO ENTERPRISES SELIGMAN, FRED 5100 E. LA PALMA #202 ANAHEIM, CA 92807 RECDR DOC # 87/000563252 |
| 666-131-15 | 15 | 5.85 | INDUSTRIAL PARK | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-131-09 SITE 3 | 09 | 10.826 | INDUSTRIAL PARK | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-131-08 | 08 | 0.85 | INDUSTRIAL PARK | COUNTY OF ORANGE |
| 666-131-16 | 16 | 0.17 | INDUSTRIAL PARK | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-131-13 | 13 | 0.55 | INDUSTRIAL PARK | CAPISTRANO ACRES MUTUAL WATER CO P O BOX 607 SAN JUAN CAPISTRANO, CA 92675 |
| 666-131-14 | 14 | 0.05 | INDUSTRIAL PARK | CAPISTRANO ACRES MUTUAL WATER CO P O BOX 607 SAN JUAN CAPISTRANO, CA 92675 |
| 666-131-07 | 07 | 0.2 | INDUSTRIAL PARK | CAPISTRANO ACRES MUTUAL WATER CO P O BOX 607 SAN JUAN CAPISTRANO, CA 92675 |

**TABLE B-5
(CONTINUED)
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #3 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|--------------------|---|
| 666-232-04 | 04 | 5.177 | GENERAL OPEN SPACE | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-232-09 | 09 | 3.53 | GENERAL OPEN SPACE | CITY OF SAN JUAN CAPISTRANO 100 AVENIDA PRESIDIO SAN CLEMENTE, CA 92672 |
| 666-232-08 | 08 | 1.09 | GENERAL OPEN SPACE | ORTEGA PROPERTIES 1 BROOKHOLLOW DR SANTA ANA, CA 92705 |
| 666-232-07 | 07 | | GENERAL OPEN SPACE | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-232-05 | 05 | | GENERAL OPEN SPACE | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-232-06 | 06 | | GENERAL OPEN SPACE | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-232-01 | 01 | | GENERAL OPEN SPACE | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |

**TABLE B-5
(CONTINUED)
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #3 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|--------------------------|---|
| 666-232-02 | 02 | | GENERAL OPEN SPACE | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-232-03 | 03 | | GENERAL OPEN SPACE | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE. STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-011-05 | 05 | 1.74 | GENERAL OPEN SPACE | CITY OF SAN JUAN CAPISTRANO 32400 PASEO ADELANTO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 013973/01750 |
| 666-011-17 | 17 | 31.91 | OPEN SPACE RECREATION | GLENDALE FEDERAL SAVINGS & LOAN ASS. 401 N. BRAND BLVD GLENDALE, CA 91209 RECDR DOC # 009756/00217 |
| 666-011-03 | 03 | 24.38 | OPEN SPACE RECREATION | GLENDALE FEDERAL SAVINGS & LOAN ASS. 401 N. BRAND BLVD GLENDALE, CA 91209 RECDR DOC # 009756/00217 |
| 666-241-01 | 01 | | GENERAL COMMERCIAL | ROMER, FRANCIS C P O BOX 520 SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 011142/00275 |
| 666-241-02 | 02 | | GENERAL COMMERCIAL | ROMER, FRANCIS C P O BOX 520 SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 011142/00275 |

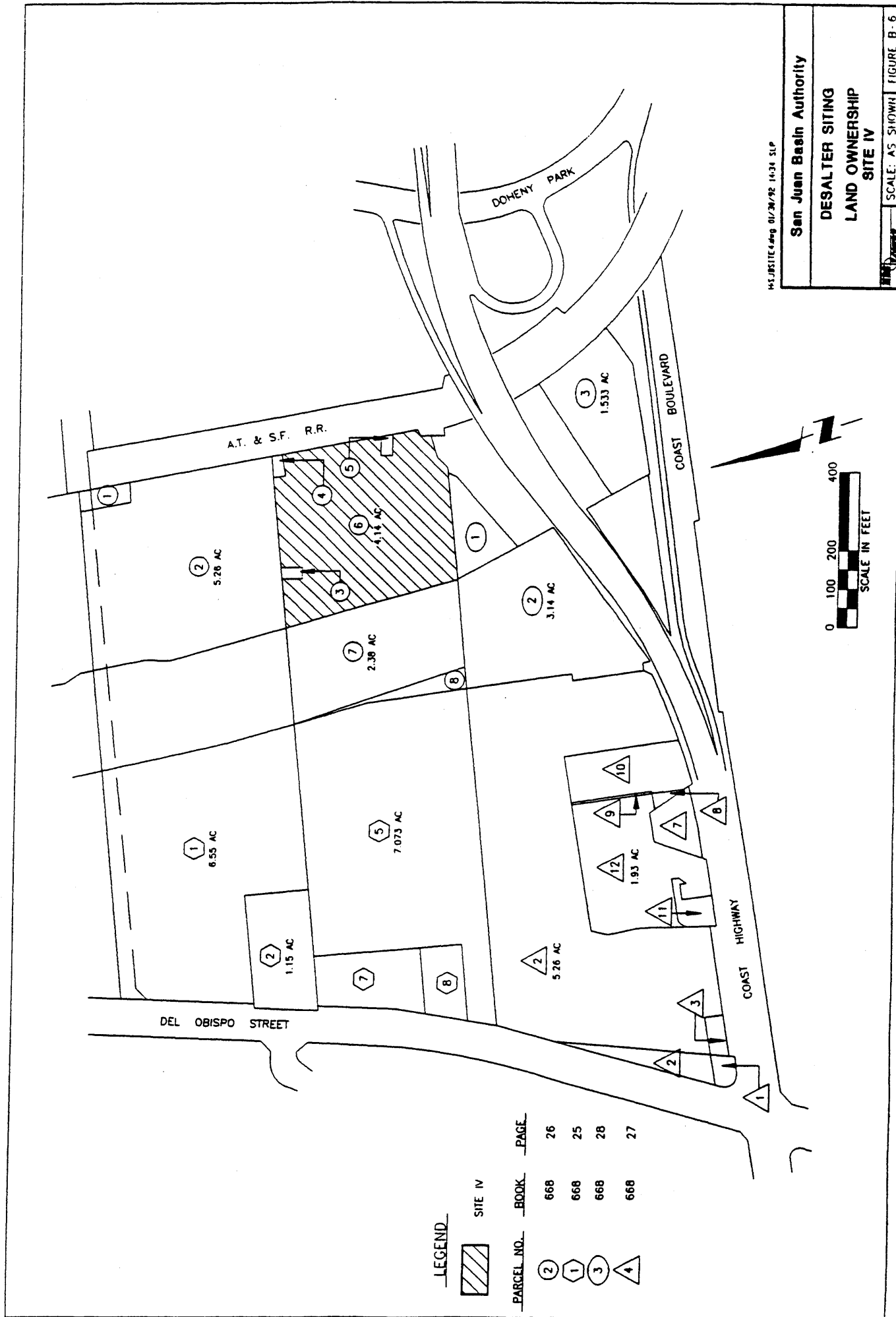
**TABLE B-5
(CONTINUED)
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #3 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|--------------------|--|
| 666-241-04 | 04 | | GENERAL COMMERCIAL | ROMER, FRANCIS C P O BOX 520 SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 82/000244950 |
| 666-241-05 | 05 | 1.56 | GENERAL COMMERCIAL | ROMER, FRANCIS C P O BOX 520 SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 012902/01065 |
| 666-241-06 | 06 | 1.92 | GENERAL COMMERCIAL | GOYA, PAUL Y P O BOX 278 27232 GANADO DR SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 008408/00360 |
| 666-241-07 | 07 | 1.205 | GENERAL COMMERCIAL | REAL ESTATE HOLDINGS INC NEWCO MGNT CO 6320 CANOGA AVE STE 1430 WOODLAND HILLS, CA 91367 RECDR DOC # 89/227980 |
| 666-241-08 | 08 | 1.11 | GENERAL COMMERCIAL | CAPISTRANO COLLECTION ASSOC LTD 1400 QUAIL ST STE 270 NEWPORT BEACH, CA 92660 RECDR DOC # 89/124611 |
| 666-241-09 | 09 | | GENERAL COMMERCIAL | GRESHAM, RICHARD HART TR 18 TERRAZA DEL MAR DANA POINT, CA 92629 RECDR DOC # 86/000379276 |



SITE III

View towards the Northeast, taken from I-5 just
south of Ortega Highway



MLJBSITE4.dwg 01/20/92 14:38 SLP

San Juan Basin Authority

DESALTER SITING

LAND OWNERSHIP

SITE IV

SCALE: AS SHOWN

FIGURE B-6

**TABLE B-6
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #4 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|-------------|--|
| 668-261-05 | 05 | .034 | INDUSTRIAL | CAPISTRANO BEACH SANITARY DIST. P O BOX 8 CAPSTRANO BCH, CA 92672 RECDR DOC # 007309/00204 |
| 668-261-06 SITE 4 | 06 | 4.14 | INDUSTRIAL | CAPISTRANO BEACH SANITARY DIST P O BOX 2008 CAPSTRANO BCH, CA 92624 |
| 668-261-04 | 04 | 0.034 | INDUSTRIAL | CAPISTRANO BEACH SANITARY DIST. P O BOX 8 CAPSTRANO BCH, CA 92672 RECDR DOC # 007309/00204 |
| 668-261-03 | 03 | 0.034 | INDUSTRIAL | CAPISTRANO BEACH COUNTY WATER DIST P O BOX 515 CAPSTRANO BCH, CA 92624 |
| 668-261-02 | 02 | 5.26 | INDUSTRIAL | CAPISTRANO BEACH SANITARY DIST P O BOX 8 CAPSTRANO BCH, CA 92672 |
| 668-261-01 | 01 | | INDUSTRIAL | CAPISTRANO BEACH SANITARY DIST P O BOX 8 CAPSTRANO BCH, CA 92672 |
| 668-261-07 | 07 | 2.38 | SJC CHANNEL | ORANGE COUNTY FLOOD CONTROL DIST |
| 668-261-08 | 08 | | | ORANGE COUNTY FLOOD CONTROL DIST |
| 668-271-04 | 04 | 8.82 | | DANA POINT MARINA-THREE 3187-H AIRWAY AVE COSTA MESA, CA 92626 RECDR DOC # 89/043875 |
| 668-271-10 | 10 | | | VARDAKOSTAS, EVANGELOS VARDAKOSTAS, MAHEEN 27046 CALLE DOLORES CAPISTRANO BEACH, CA 92675 RECDR DOC # 86/000393467 |

**TABLE B-6
(CONTINUED)
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING**

SITE #4 AND ADJACENT PARCELS

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|--------------------|---|
| 668-271-08 | 08 | | | VARDAKOSTAS, EVANGELOS VARDAKOSTAS, MAHEEN 34344 PACIFIC COAST HWY DANA POINT, CA 92629 RECDR DOC # 86/000393467 |
| 668-271-09 | 09 | | | DOHENY PARK PLAZA P O BOX 10187 NEWPORT BEACH, CA 92658 RECDR DOC # 012304/01877 |
| 668-271-07 | 07 | | | ATLANTIC RICHFIELD CO PS&T TAX DEPT SS#00447-11 P O BOX 2485 LOS ANGELES, CA 90051 RECDR DOC # 008064/00ENG |
| 668-271-12 | 12 | 1.93 | PARK | DOHENY PARK PLAZA P O BOX 10187 NEWPORT BEACH, CA 92658 |
| 668-271-11 | 11 | | PARK | DOHENY PARK PLAZA CARL KARCHER ENTRPS INC P O BOX 10187 NEWPORT BEACH, CA 92658 |
| 668-251-05 | 05 | 7.073 | INDUSTRIAL | SOUTH EAST REGIONAL RECLAMATION AUTHORITY 25411 CABOT RD SUITE 209 LAGUNA HILLS, CA 92655 |
| 668-251-01 | 01 | 6.55 | DEL OBISPO PARK | CAPISTRANO BAY PARK & RECREATION DIST P O BOX 2217 CAPSTRANO BCH, CA 92624 RECDR DOC # 011565/01860 |
| 668-251-02 | 02 | 1.15 | INDUSTRIAL | COUNTY OF ORANGE |
| 668-251-07 | 07 | | INDUSTRIAL | SOUTH EAST REGIONAL RECLAMATION AUTHORITY SUITE 209 25411 CABOT RD LAGUNA HILLS, CA 92653 RECDR DOC # 87/000096007 |

**TABLE B-6
(CONTINUED)
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #4 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP PARCEL NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|----------------------|-----------------|-------------|---|
| 668-251-08 | 08 | | INDUSTRIAL | DANA POINT SANITARY DIST 34152 DEL OBISPO ST DANA POINT, CA 92629 |
| 668-281-01 | 01 | | INDUSTRIAL | CAPISTRANO BEACH SANITARY DIST. P O BOX 571 DANA POINT, CA 92629 |
| 668-281-02 | 02 | 3.14 | SJC CHANNEL | ORANGE COUNTY FLOOD CONTROL DIST. |
| 668-282-03 | 03 | 1.533 | | PATEL, CHANDULAL K PATEL, GEETA C 17595 ALMAHURST RD #208 CITY OF INDUSTRY, CA 91748 RECDR DOC # 85/000244030 |

SAN JUAN BASIN AUTHORITY
CONJUNCTIVE USE FACILITIES SITE EVALUATIONS



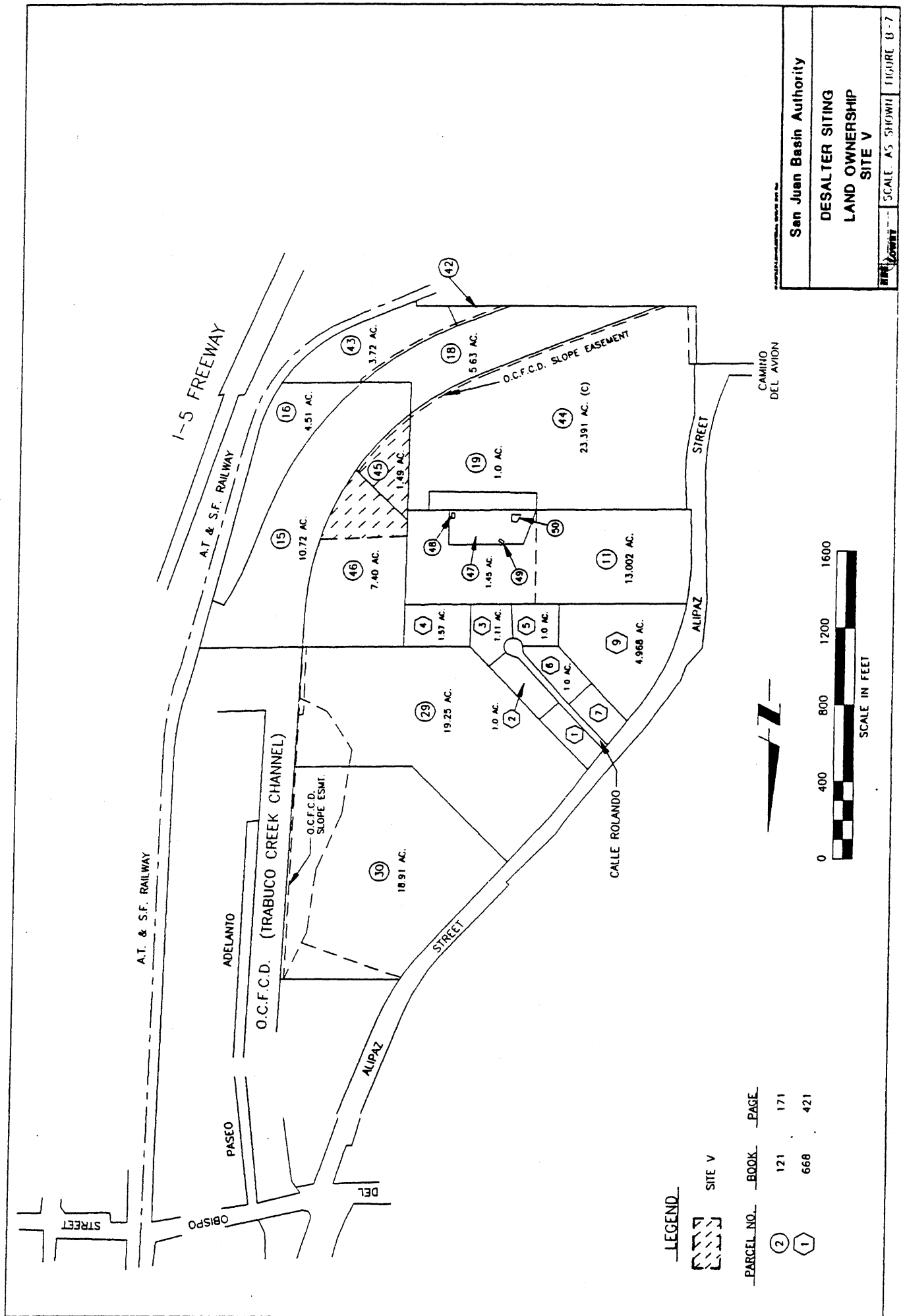
SITE IV

View towards the
South with San Juan
Creek on the right
approximately 1000
feet north of Pacific
Coast Highway

SITE IV

View towards
the Southeast





**TABLE B-7
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #5 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP ARCE NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|--------------------|-----------------|--|---|
| 121-171-44 | 44 | 23.391 | MOBILE HOME PARK MED.HIGH DENSITY 8 DU'S/AC MAX | SEE CONDOMINIUM PROJECT LISTED UNDER 931-98-251 THRU 421 |
| 121-171-45 SITE 5 | 45 | 1.49 | MOBILE HOME PARK MED.HIGH DENSITY 8 DU'S/AC MAX | CAPISTRANO VALLEY WATER DISTRICT P.O BOX 967 SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 87/000084702 |
| 121-171-46 SITE 5 | 46 | 7.4 | SPEC. STUDY AREA R.V STORAGE | FORSTER, THOMAS A TR P.O BOX 146 SAN JUAN CAPISTRANO, CA 92693 |
| 121-171-19 | 19 | 1 | SPEC. STUDY AREA | OSTERMILLER, DONNA M TR 522 S EL CAMINO REAL SAN CLEMENTE, CA 92672 RECDR DOC # 87/000152171 |
| 121-171-47 | 47 | 1.45 | SPEC. STUDY AREA | FORSTER, THOMAS A TR P.O BOX 146 SAN JUAN CAPISTRANO, CA 92693 RECDR DOC # 87/000084703 |
| 121-171-48 | 48 | | SPEC. STUDY AREA WELL LOCATION | CAPISTRANO VALLEY WATER DISTRICT P.O BOX 967 SAN JUAN CAPISTRANO, CA 92675 |
| 121-171-49 | 49 | | SPEC. STUDY AREA | CAPISTRANO VALLEY WATER DISTRICT P.O BOX 967 SAN JUAN CAPISTRANO, CA 92675 |
| 121-171-50 | 50 | | SPEC. STUDY AREA | CAPISTRANO VALLEY WATER DISTRICT P.O BOX 967 SAN JUAN CAPISTRANO, CA 92675 |
| 121-171-11 | 11 | 13.002 | SPEC. STUDY AREA/ MED.HIGH DENSITY 8 DU'S/AC MAX | FORSTER,ELIZABETH M ET AL P.O BOX 146 SAN JUAN CAPISTRANO, CA 92693 |
| 121-171-29 | 29 | 19.25 | MOBILE HOME PARK MED.HIGH DENSITY 8 DU'S/AC MAX | OYHARZABAL, CARMEN TR %DPH INVESTMENT CO 1050 ROSECRANS ST STE M-1 SAN DIEGO, CA 92106 RECDR DOC # 011261/00496 |

**TABLE B-7
(CONTINUED)
LAND OWNERSHIP
SAN JUAN BASIN
R/O SITING
SITE #5 AND ADJACENT PARCELS**

| ASSESSOR'S PARCEL NO. | MAP ARCE NO. | AREA (acres) | LAND USE | OWNER AND ADDRESS |
|--------------------------|--------------------|-----------------|-----------------------------------|---|
| 668-421-01 | 01 | | MED.HIGH DENSITY 8 DU'S/AC MAX | SINES, JEFFREY M SINES, ELIZABETH D 226 VISTA MARINA SAN CLEMENTE, CA 92672 RECDR DOC # 89/615918 |
| 668-421-02 | 02 | 1 | MED.HIGH DENSITY 8 DU'S/AC MAX | MEYER, GRANT B JR MEYER, HELEN J MICRO PRECISION SWISS INC 26401 CALLE ROLANDO SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 89/190339 |
| 668-421-03 | 03 | 1.11 | MED.HIGH DENSITY 8 DU'S/AC MAX | PITIS, ROGER R 34031 EL CONTENTO DR. DANA POINT, CA 92629 RECDR DOC # 013939/01321 |
| 668-421-04 | 04 | 1.57 | MED.HIGH DENSITY 8 DU'S/AC MAX | PITIS, ROGER R 34031 EL CONTENTO DR. DANA POINT, CA 92629 RECDR DOC # 013939/01321 |
| 668-421-05 | 05 | 1 | MED.HIGH DENSITY 8 DU'S/AC MAX | CAPISTRANO PROPERTIES 31508 MAR VISTA SOUTH LAGUNA, CA 92677 RECDR DOC # 87/000706208 |
| 668-421-06 | 06 | 1 | MED.HIGH DENSITY 8 DU'S/AC MAX | CAPISTRANO PROPERTIES 31508 MAR VISTA SOUTH LAGUNA, CA 92677 RECDR DOC # 87/000706208 |
| 668-421-07 | 07 | | MED.HIGH DENSITY 8 DU'S/AC MAX | ALIPAZ INDUSTRIAL PARK P.O BOX 945 SAN JUAN CAPISTRANO, CA 92675 RECDR DOC # 011837/01080 |
| 668-421-09 | 09 | 4.968 | MED.HIGH DENSITY 8 DU'S/AC MAX | SEE CONDOMINIUM PROJECT LISTED UNDER 939-61-001 THRU 40 |

SAN JUAN BASIN AUTHORITY
CONJUNCTIVE USE FACILITIES SITE EVALUATIONS



SITE V

View towards the
Southwest, taken
from R.V. storage
area

SITE V

View towards the
Southeast, taken from
R.V. storage area



**TABLE B-8
SAN JUAN BASIN AUTHORITY
POTENTIAL WELL SITES**

| Well Site | Land Use | Ownership | Site Area |
|-----------|-------------------------------|---|-----------|
| 41 | General Open Space | Anderson, Derri 610 Newport Ct. Dr. Suite 690 Newport Beach, CA 92660 Recdr Doc #89/307661 | 30'x40' |
| 42 | Open Space Public Park Site | City of San Juan Capistrano 32400 Paseo Adelanto San Juan Capistrano, CA 92675 | 30'x40' |
| 43 | General Open Space | Hoffman, Walter TR 35821 Beach Road Capistrano Beach, CA 92624 APN 124-223-74 | 40'x50' |
| 44 | General Open Space | Hoffman, Walter TR 35821 Beach Road Capistrano Beach, CA 92624 | 40'x50' |
| 45 | Open Space Recreational | Glendale Federal Savings & Loan Assn. 401 N. Brand Blvd. Glendale, CA 91209 Recdr Doc #009756/00217 APN 666-011-17 | 30'x40' |
| 46 | Public and Institutional Uses | Huish, John M. TR 33208 Paseo Cervaza, Suite O San Juan Capistrano, CA 92675 APN 666-011-16 Recdr Doc #90/045102 | 30'x40' |
| 47 | Open Space | Harrison, Lorrin C TR Gordon, Alan P. 27451 Ortega Highway San Juan Capistrano, CA 92675 APN 121-253-04 | 30'x40' |
| 48 | Open Space | City of San Juan Capistrano 32400 Paseo Adelanto San Juan Capistrano, CA 92675 APN 668-211-19/21 | 30'x40' |
| 49 | Single Family | Mariners Village Owners Assoc. % Turn-Key Assoc. 31706 Coast Highway, Suite 302 South Laguna, CA 92677 APN 668-232-27 | 30'x40' |

TABLE B-8
SAN JUAN BASIN AUTHORITY
POTENTIAL WELL SITES
(CONTINUED)

| Well Site | Land Use | Ownership | Site Area |
|-----------|----------------------|--|-----------|
| 50 | General Agricultural | Kinoshita Properties P. O. Box 201 San Juan Capistrano, CA 92675 APN 121-190-56 | 30'x40' |
| 51 | General Agricultural | Vermeulen, Charles I. 11591 Cielo Place Santa Ana, CA 92705 APN 121-182-53 | 30'x40' |
| 52 | General Commercial | Blazer, Betty Jean % Capistrano Capital 32107 Alipaz Street San Juan Capistrano, CA 92675 APN 668-151-05 | 30'x40' |
| 53 | General Commercial | Seaside Ranchos P. O. Box 444 Tustin, CA 92680 APN 668-241-24 | 30'x40' |
| 54 | General Open Space | J. F. Shea Company, Inc. 655 Brea Canyon Road Walnut, CA 91789 APN 121-070-30 | 40'x50' |
| 55 | General Open Space | Oso Ranch Company P. O. Box 936 San Juan Capistrano, CA 92675 APN 121-070-57 | 40'x50' |
| 56 | General Open Space | Daniel, Oren Mathew TR 9450 Adelaida Road Paseo Robles, CA 93446 APN 121-050-21 | 40'x50' |

TABLE B-9
SAN JUAN BASIN AUTHORITY
POTENTIAL RECHARGE SITES

| Recharge Site | Land Use | Ownership | Site Area |
|---------------|-------------------------------------|--|-----------|
| 1 | General Open Space | San Juan Partnership No. 2 % Viejo Management Company P. O Box 9 San Juan Capistrano, CA 92693 APN 125-161-07/06 | 20 AC |
| 2 | General Open Space | Santa Margarita Company % Viejo Management Company P. O Box 9 San Juan Capistrano, CA 92693 APN 125-171-08/10 | 28 AC |
| 3 | Very Low Density/General Open Space | Santa Margarita Company % Viejo Management Company P. O Box 9 San Juan Capistrano, CA 92693 APN 125-172-01 | 11 AC |
| 4 | Open Space Preservation | Glendale Federal Savings & Loan 401 N. Brand Blvd. Glendale, CA 91209 APN 124-223-51 | 6.5 AC |
| 5 | Industrial Park | Real Estate Holdings, Inc. Newco Management Company 6320 Canoga Ave., Suite 1430 Woodland Hills, CA 91367 APN 666-131-09 | 10 AC |
| 6 | General Open Space | Oso Ranch Company P. O. Box 936 San Juan Capistrano, CA 92675 APN 121-070-55/57 Daniel, Oren Mathew TR 9450 Adelaida Road Paseo Rubles, CA 93446 APN 121-050-21 | 35 AC |

APPENDIX C

PRELIMINARY COST ESTIMATE ULTIMATE CONJUNCTIVE USE FACILITIES

TABLE C-1

**ULTIMATE CONJUNCTIVE USE FACILITIES
PRELIMINARY COST ESTIMATE**

CAPITAL COST

| DESCRIPTION | COST \$ |
|--|-------------------|
| Well - Complete with Pump (12 Wells @ \$250,000 ea) | 3,000,000 |
| Desalter Plant | |
| 8 MGD R.O. Plant Complete | 13,672,000 |
| Desalter Building (16,400 sq.ft. @ \$20/sq. ft.) concrete tilt-up. Includes plumbing, electrical, foundation, etc. | 328,000 |
| Office Building (4,000 sq. ft. @ \$80/sq. ft.) | 320,000 |
| Site Improv. Paving, Grading, Storm Drain, Water & Sewer, etc. | 500,000 |
| Access Road - Asphalt Paving (\$3/sq. ft.) | 100,000 |
| Reservoir (1 MG @ \$.38/gal.) | 380,000 |
| Pump Stations - (Valves & Piping Included) | |
| @ Desalter Plant 5-250 HP @ \$150,000 ea. | 750,000 |
| Building (60 ft. x 20 ft. @ \$150/sq. ft.) | 180,000 |
| @ CVWD PRV Station 4-200 HP @ \$125,000 ea. | 500,000 |
| Building (50 ft. x 20 ft. @ \$150/sq. ft.) | 150,000 |
| Brine Line - (1,000 LF - 12 in. @ \$60/LF) - Installed | 60,000 |
| Product Line - (19,200 LF - 20 in. @ \$100/LF) - Installed | 1,900,000 |
| Raw Water, Well Collection Pipelines - Installed | |
| Middle San Juan (16,000 LF - 12 in. @ \$60/LF) | 960,000 |
| Trabuco Creek (10,000 LF - 14 in. @ \$70/LF) | 700,000 |
| Lower San Juan (12,000 LF - 16 in. @ \$80/LF) | 960,000 |
| Brine Capacity Charge (SERRA and Chiquita Outfalls) | 1,550,000 |
| Subtotal | 26,010,000 |
| Engineering, Surveying, Etc. -15% | 3,901,000 |
| Contingencies - 15% | 3,901,000 |
| TOTAL CAPITAL COSTS | 33,812,000 |

TABLE C-2

**ULTIMATE CONJUNCTIVE USE FACILITIES
PRELIMINARY COST ESTIMATE**

OPERATION AND MAINTENANCE COSTS

| POTABLE WATER PLANT PRODUCTION ANNUAL COST | 3,500 AF/YR \$/YR (4) | 10,500 AF/YR \$/YR (5) |
|---|----------------------------------|-----------------------------------|
| DESALTER | | |
| Fixed O&M (1) | 133,000 | 133,000 |
| Variable O&M (2) | | |
| Chemicals, Labor, Replacement | 348,300 | 916,200 |
| Energy | 419,800 | 787,200 |
| PUMP STATION | | |
| @ Desalter | | |
| Fixed | 7,300 | 7,300 |
| Variable O&M | | |
| Labor, Spare Parts, Service | 0 | 25,000 |
| Energy | 287,800 | 863,300 |
| CVWD PRV | | |
| Fixed O&M | N/A | 12,500 |
| Variable O&M | | |
| Energy | N/A | 444,400 |
| WELLS | | |
| Fixed O&M @ 2.5 % Capital | 24,800 | 24,800 |
| Variable O&M | | |
| Labor, Spare Parts, Service | 0 | 8,300 |
| Energy (3) | 129,800 | 324,600 |
| OCEAN OUTFALL | | |
| Fixed O&M | 3,300 | 3,300 |
| Variable O&M | 0 | 6,600 |
| Total O&M Fixed | 168,400 | 180,900 |
| Total O&M Variable | 1,185,7000 | 3,375,600 |
| Total O&M | 1,354,100 | 3,556,500 |
| Total O&M/AF | 387 | 339 |

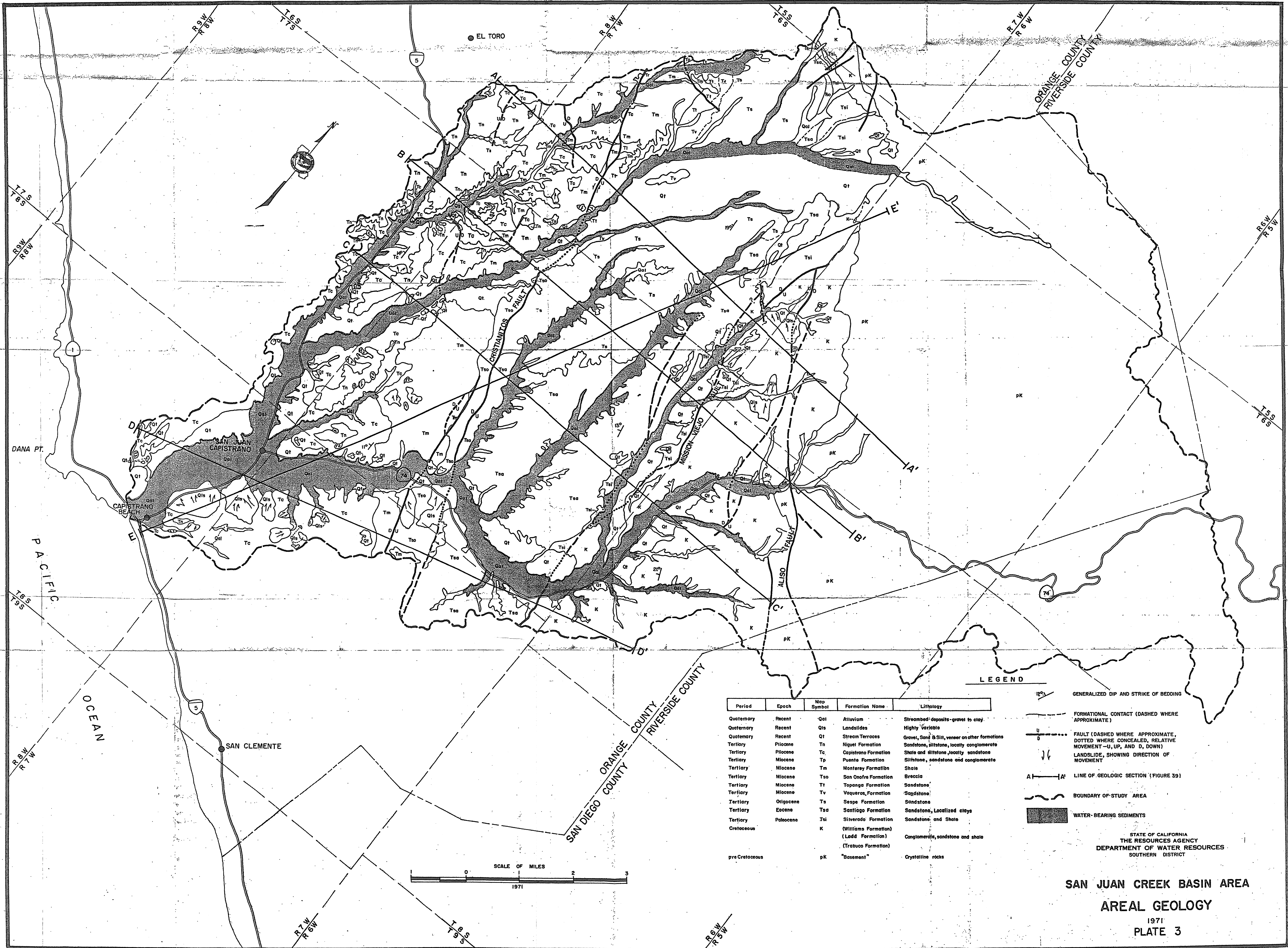
TABLE C-2

**ULTIMATE CONJUNCTIVE USE FACILITIES
PRELIMINARY COST ESTIMATE**

**OPERATION AND MAINTENANCE COSTS
(Cont'd)**

NOTES AND ASSUMPTIONS

1. Includes labor and maintenance supply costs.
2. Includes chemical, energy, labor, maintenance supply, and membrane replacement costs.
3. Based on providing 45 psi delivery pressure at inlet to desalting plant.
4. Energy cost assumed to be \$0.11/KWH, and 150 days per year operation.
5. Energy cost assumed to be \$0.11/KWH, and 330 days per year operation.



| Period | Epoch | Map Symbol | Formation Name | Lithology |
|----------------|-----------|------------|---|---|
| Quaternary | Recent | Qal | Alluvium | Streambed deposits-gravel to clay |
| Quaternary | Recent | Qis | Landslides | Highly variable |
| Quaternary | Recent | Qt | Stream Terraces | Gravel, sand & silt, veneer on other formations |
| Tertiary | Pliocene | Tn | Niquet Formation | Sandstone, siltstone, locally conglomerate |
| Tertiary | Pliocene | Tc | Capistrano Formation | Shale and siltstone, locally sandstone |
| Tertiary | Miocene | Tp | Puente Formation | Siltstone, sandstone and conglomerate |
| Tertiary | Miocene | Tm | Monterey Formation | Shale |
| Tertiary | Miocene | Tso | San Onofre Formation | Breccia |
| Tertiary | Miocene | Ti | Topanga Formation | Sandstone |
| Tertiary | Miocene | Tv | Vaqueros Formation | Sandstone |
| Tertiary | Oligocene | Ts | Sespe Formation | Sandstone |
| Tertiary | Eocene | Tsa | Santiago Formation | Sandstone, localized clays |
| Tertiary | Paleocene | Tsl | Silverado Formation | Sandstone and shale |
| Cretaceous | | K | (Williams Formation) (Ladd Formation) (Trabuco Formation) | Conglomerate, sandstone and shale |
| pre Cretaceous | | pK | "Basement" | Crystalline rocks |

- LEGEND
- GENERALIZED DIP AND STRIKE OF BEDDING
 - FORMATIONAL CONTACT (DASHED WHERE APPROXIMATE)
 - FAULT (DASHED WHERE APPROXIMATE, DOTTED WHERE CONCEALED, RELATIVE MOVEMENT—U, UP, AND D, DOWN)
 - LANDSLIDE, SHOWING DIRECTION OF MOVEMENT
 - LINE OF GEOLOGIC SECTION (FIGURE 39)
 - BOUNDARY OF STUDY AREA
 - WATER-BEARING SEDIMENTS

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

**SAN JUAN CREEK BASIN AREA
AREAL GEOLOGY**
1971
PLATE 3

104-71 plate

Appendix C

Calculation of Dry Year Demands

Demand “Bump” Factors for 2010 UWMP

Description of Methodology

Water agencies must develop estimates of the impacts of single dry years (Single-Dry) and multiple consecutive dry years (Multiple-Dry) on both supplies and demands in future years. In these cases, demands increase somewhat above the normal or average level. The increase can be expressed as a percent “bump” up from the normal level. For example, if dry year demand was 105 percent of normal, this would be a 5% “bump”. As the methodology to estimate the Single-Dry and Multiple-Dry “bumps” was developed, several issues needed to be decided, as follows:

1. The methodology used existing data from MWDOC records for each agency, to allow the estimates to reflect the characteristics and differences of demands relative to the makeup of each retail entity. The overall MWDOC estimate was developed from a weighted sum of all of OC’s agencies.
2. Total potable demands, including agricultural demands, were used to derive the “bumps” because Orange County agencies have opted to have water that is used for agricultural uses be considered as full service demands. Non-potable demands are included; these demands will be met with non-potable supplies.
3. The methodology focused on per-capita usage (in units of AF/capita) because this removes the influence of growth from the analysis. Overall population growth in Orange County has been about 1% per year over the past two decades, creating about a 20% increase in demand over two decades. Some of the agencies have had even higher growth.
4. The period that was used for the analysis was limited to FY 1992-93 thru FY 2008-09 because fiscal years 1991-92 and 2009-10 were years of extraordinary conservation-- pricing disincentives for using over the allocated amounts were implemented in order to curtail demands-- and so these years were not considered. The Orange County total per-capita water usage in the period FY 1992-93 thru FY 2008-09 is plotted in Figure 1. Per-capita water use in Orange County has been on a decreasing trend in recent years as shown by the trend line in Figure 1. The downward trend is likely due to water use efficiency efforts, principally the plumbing codes since 1992 that have required low-flush toilets in all new construction and prohibited the sale of high-flush toilets for replacement purposes. Because of this drop in per-capita usage over time, the more recent data is a better predictor of future usage than the earlier data. Therefore, we narrowed the focus to the period FY 2001-02 thru FY 2008-09.
5. **Single-Dry “Bump” Methodology:** Per-capita usage for each participant agency from FY 2001-02 thru FY 2008-09 is shown in Table 1. The Single-Dry Bump for each agency was derived using the highest per-capita usage in the period, divided by average per-capita usage for that period. Because of suspect data for Fountain Valley and Santa Ana, the highest year data was eliminated and the second-highest usage in the period was used (when data was suspect, it was also removed from the average for the agency). The resulting Single-Dry “bumps” are shown in Table 2. The OC-average Single-Dry “bump” came to 6.6%
6. **Multiple-Dry “Bump” Methodology:** DWR guidelines recommend that “multiple” years is three years. There are various methods that can be used to derive demand “bumps” for those three years. The same “bump” can be used for all three years, or different “bumps” can be assumed for each of the three years. A pattern can be selected based on historical demand data or on historical water supply data or on another basis. MWDOC selected a Multiple-Dry Bump as the same as the Single-Dry Bump for each agency. This means having three highest-demand years in a row. This is conservative because it would be extremely unlikely for three driest years to occur in a row. However, it should be noted that future demand in any particular year depends on other factors in addition to rainfall, such as the economic situation, and cloudiness, windiness, etc. The OC-average Multiple-Dry “bump” came to 6.6%.

Figure 1
Per-Capita Water Use in Orange County (AF/person)

| FY Ending | OC Actual AF/person | Least Sq AF/person | approx high | approx "bump" |
|-----------|------------------------|-----------------------|----------------|------------------|
| 1993 | 0.223327 | 0.233 | 0.250 | 7% |
| 1994 | 0.223528 | 0.232 | | |
| 1995 | 0.221986 | 0.230 | | |
| 1996 | 0.235919 | 0.229 | | |
| 1997 | 0.244071 | 0.228 | | |
| 1998 | 0.217014 | 0.226 | | |
| 1999 | 0.228797 | 0.225 | | |
| 2000 | 0.242408 | 0.224 | | |
| 2001 | 0.223537 | 0.222 | | |
| 2002 | 0.228534 | 0.221 | | |
| 2003 | 0.214602 | 0.219 | | |
| 2004 | 0.222155 | 0.218 | | |
| 2005 | 0.204941 | 0.217 | | |
| 2006 | 0.207720 | 0.215 | | |
| 2007 | 0.223599 | 0.214 | | |
| 2008 | 0.211873 | 0.212 | | |
| 2009 | 0.202396 | 0.211 | 0.225 | 7% |

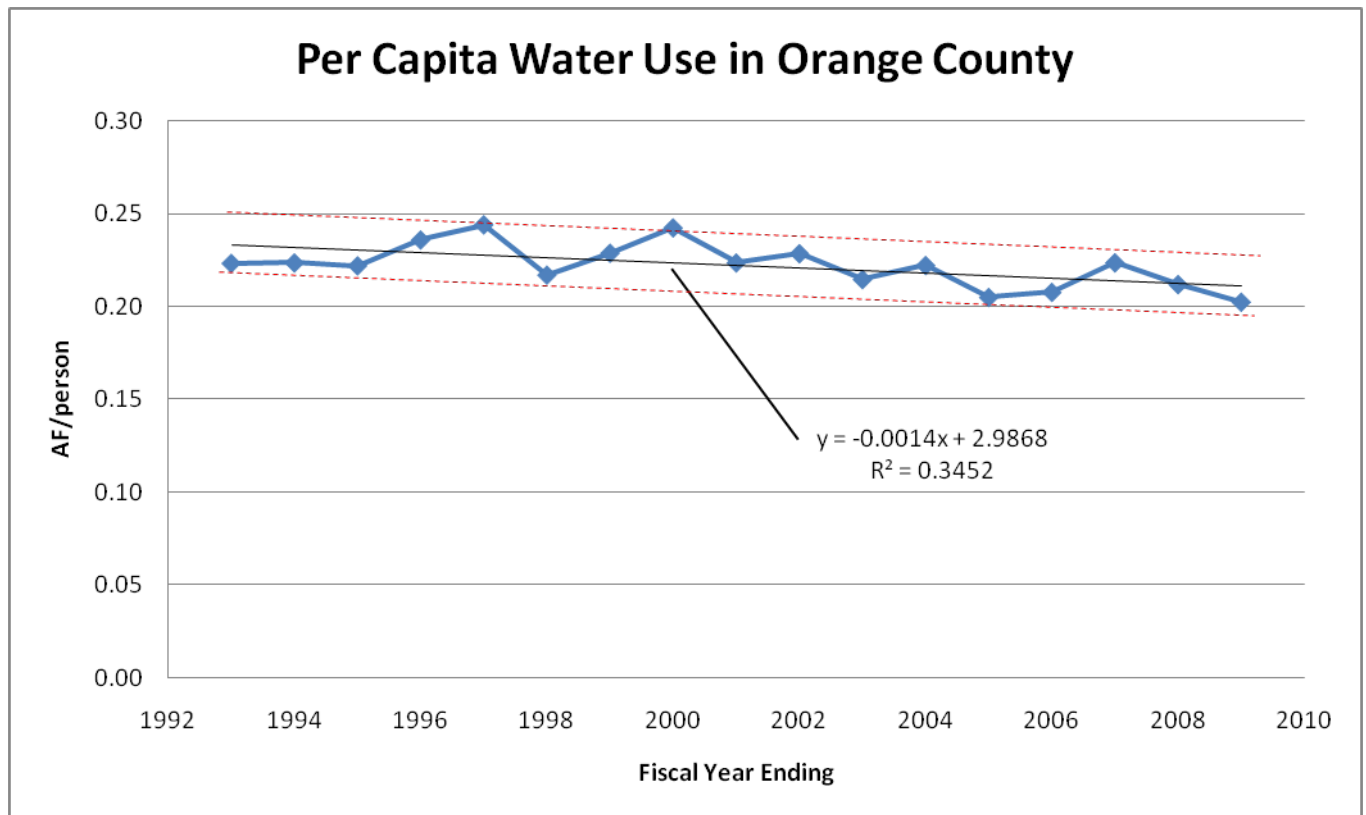


Table 1. Per-Capita Retail Water Usage by Retail Water Agency [1] [2]

| Fiscal Year -> | 2001-02 | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 |
|----------------|--|---------|---------|---------|---------|---------|---------|---------|
| | Per Capita Retail Water Usage (AF/person) | | | | | | | |
| South Coast WD | 0.22187 | 0.21471 | 0.22117 | 0.21229 | 0.20465 | 0.22881 | 0.21979 | 0.20822 |

[1] Retail water usage (includes recycled water and Agricultural usage) divided by population.

[2] Population is for Jan. 1 of each fiscal year ending. Source: Center for Demographic Research, CSU Fullerton.

Table 2

Demand Increase "Bump" Factors for Single Dry Years and Multiple Dry Years

for OC Water Agencies participating in MWDOC's 2010 UWMP group effort

| | Single | Multiple | |
|----------------|--------|----------|---|
| South Coast WD | 5.7% | 5.7% | |
| OC Average | 6.6% | 6.6% | weighted average of all OC water agencies |

Appendix D

Resolution No. 23-85/86; Ordinance No. 206

Resolution No. 23-85/86

RESOLUTION NO. 23-85/86

A RESOLUTION OF THE BOARD OF DIRECTORS OF SOUTH COAST COUNTY
WATER DISTRICT REQUIRING FUTURE DEVELOPMENTS TO UTILIZE RECLAIMED
WATER WHEREVER FEASIBLE WITHIN THE BOUNDARIES OF THE DISTRICT

WHEREAS, South Coast County Water District is located in a semi-arid
climate and imports 100% of its potable water; and

WHEREAS, the District, the State of California, and the Metropolitan
Water District of Southern California ("MWD") have made a significant
investment in a state-of-the-art water reclamation system owned and operated
by the District; and

WHEREAS, The State, MWD and the District do in fact achieve potable water
conservation as a direct result of the investment in this system, resulting
in an increased availability of imported domestic water in the MWD service
area; and

WHEREAS, California Water Code Sections 13550 and 13551 declare a
statewide policy that the use of potable domestic water for irrigation
purposes when reclaimed water is available constitutes a waste or unreasonable
use of water within the meaning of the State Constitution; and

WHEREAS, the South Coast County Water District intends to modify,
enhance and expand its reclamation system to better serve the consumers of
the District.

NOW, THEREFORE, the Board of Directors of South Coast County Water
District does hereby RESOLVE, FIND and ORDER as follows:

Section 1: That the South Coast County Water District policy is to
adhere to and implement to the fullest extent possible, the statewide policy
as set forth by statute, relating to the use of potable domestic water for
irrigation purposes.

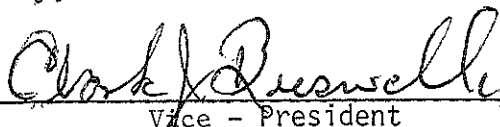
Section 2: That all future development of greenbelt and commonly owned
landscape areas that occurs within the boundaries of the South Coast County
Water District which can feasibly connect to the District's reclaimed water
distribution system, as defined by California Water Code Section 13550, shall
do so in lieu of using domestic potable water.

Section 3: That the District's reclamation system will be extended
outside the District's boundaries in any case where it is economically and
technically feasible to do so, in keeping with a mutual service policy

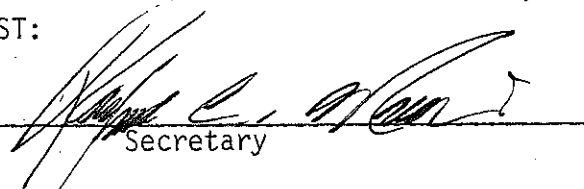
2-18-86

1 existing between South Coast County Water District and Moulton Niguel
2 Water District or which might exist in the future with any other water
3 agency.

4 PASSED AND ADOPTED at a regular meeting of the Board of Directors
5 held this 18th day of February, 1986.

6 
7 Vice - President

8 ATTEST:

9 
10 Secretary
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CERTIFICATION

I, RAYMOND C. MILLER, Secretary of the SOUTH COAST COUNTY WATER DISTRICT, Orange County, California, do hereby certify that the foregoing Resolution No. 23-85/86 was duly adopted at a regular meeting of the Governing Board of said District, held on the 18th day of February, 1986 by the following vote of members of the Board:

AYES: Directors: RUSSELL, BUSWELL, EDWARDS, BENTON, LAWRENCE, ANDERSON,

MCGUIRE

NOES: Directors: None

ABSENT: Directors: None

ABSTAIN: Directors: None

and I further certify that Clark Buswell, as ^{Vice} President, and Raymond C. Miller, as Secretary, signed and approved said Resolution on the 18th day of February, 1986.


Secretary of the Board of Directors
SOUTH COAST COUNTY WATER DISTRICT

(District Seal)

SOUTH COAST WATER DISTRICT

Water Conservation & Water Supply Shortage Ordinance 206, adopted 4/23/09

PERMANENT CONSERVATION REQUIREMENTS (mandatory)

For All Water Users

Leaks

- ◆ Fix leaks, breaks and malfunctions in reasonable time or 5 days of District notice. (Shutting off irrigation system during repairs constitutes a fix.)

Watering/Irrigation

- ◆ No watering between 9 a.m. and 5 p.m., except with a hand-held bucket/container or hand-held hose with automatic shut-off nozzle or for short system adjustments or repairs.
- ◆ No more than 10 minutes of watering per valve per cycle on unattended irrigation systems, except for weather-based/very low-flow drip systems.
- ◆ Runoff or water flow from irrigation must not exceed minimal levels (not enter storm drains)
- ◆ Turn off irrigation systems when it rains. All new residential irrigation systems must have rain sensors, smart controllers/evapo-transpiration sensors and/or manual on-off function.

Hosing/Washing

- ◆ No hosing or washing down hard or paved surfaces, except for safety and sanitary hazards using a hand-held bucket/container, hand-held hose with automatic shut-off nozzles or low-volume, high-pressure cleaning machine
- ◆ No hosing or washing down vehicles, except using a hand-held bucket/container, hand-held hose with automatic shut-off nozzle, a commercial car wash or commercial mobile detailer.

Other

- ◆ **Effective 1/1/10**, re-circulate water in decorative fountains and features.
- ◆ **Effective 1/1/11**, upon sale or transfer of property, prospective account holder must retrofit with water-efficient fixtures, as needed: toilets, showerheads, aerators, and irrigation system rain sensors.
- ◆ No unauthorized use of fire hydrants.

PERMANENT CONSERVATION REQUIREMENTS (mandatory)

For Commercial Water Users

Irrigation

- ◆ Turn off dedicated potable irrigation systems when it rains. **Effective 1/1/10**, dedicated potable irrigation systems must have rain sensors, smart controllers/evapo-transpiration sensors and/or manual on-off

Restaurants/Lodging

- ◆ Serve water to customers only upon request.

- ◆ Provide guests the option not to launder their towels and linens.

Commercial Kitchens

- ◆ New pre-rinse kitchen spray valves must use 1.6 gallons or less per minute.
- ◆ **Effective 1/1/10**, existing spray valves must use 1.6 gallons or less per min
- ◆ Use best-available water-conserving technology in new or remodeled kitchens listed on www.cuwcc.org.
- ◆ Set scoop sinks at minimum water flow during use and shut off after hours.
- ◆ Equip hoses with automatic shut-off nozzles for sanitary wash downs.

Water Re-Circulation

- ◆ Install re-circulating systems in new car wash and laundry facilities.
- ◆ **Effective 1/1/12**, retrofit car wash facilities with re-circulating systems.
- ◆ No new single-pass cooling systems installed in buildings.

Recycled Water

- ◆ Use recycled water on commercial landscaping, as available/cost-effective.

Construction Sites

- ◆ Use recycled or non-potable water at construction sites and for soil compaction and dust control, as available. Install automatic shut-off nozzles on construction site hoses, as available.

SUPPLEMENTAL CONSERVATION MEASURES (voluntary)

Water Supply Watch – All Water Users

*Prior to a planned or potential reduction in the District's imported water supply, the Board may declare a **Water Supply Watch** to encourage the public to supplement Permanent Conservation Requirements with 10 voluntary measures focused on efficient outdoor water use.*

Irrigation

- ◆ Closely monitor irrigation systems for leaks, breaks and malfunctions.
- ◆ Target 40 psi to 60 psi for water pressure.
- ◆ Adjust irrigation controllers as the weather changes.
- ◆ Replace irrigation controller batteries in the spring and fall.
- ◆ Utilize water-efficient irrigation practices, such as smart timer/evapo-transpiration controllers; stream rotor nozzles; proper fertilization; mulch.
- ◆ Assess depth of moisture using soil probes to optimize root irrigation.
- ◆ Install a drip irrigation system.

California-Friendly Vegetation

- ◆ Plant some native, drought-tolerant or fire-resistant vegetation.
- ◆ Replace some existing turf with California-friendly vegetation.

Pools/Spas

- ◆ Cover outdoor pools, spas and water features to minimize evaporation.

SOUTH COAST WATER DISTRICT
Water Conservation & Water Supply Shortage Ordinance 206, adopted 4/23/09

LEVEL 1 WATER SHORTAGE REQUIREMENTS (mandatory)
Water Supply Alert

*The Board may declare a **Water Supply Alert** when the District experiences up to a 20% reduction in imported water supplies. Permanent and Supplemental Water Conservation Measures remain in effect.*

Leaks

- ◆ Fix leaks, breaks and malfunctions in a reasonable time or 3 business days of notice. (Shutting off irrigation system during repairs constitutes a fix.)

Watering

- ◆ Watering is limited to no more than 3 days a week (Apr-Oct) and 1 day a week (Nov-Mar) except with a hand-held bucket/container, hand-held hose with automatic shut-off nozzle or very-low-flow drip irrigation system.

The Board may:

- ◆ Require high water users (10,000+ annual billing units) to develop water conservation plans and progress reports.

LEVEL 2 WATER SHORTAGE REQUIREMENTS (mandatory)
Water Supply Warning

*The Board may declare a **Water Supply Warning** when the District experiences up to a 40% reduction in imported water supplies. Permanent, Supplemental and Level 1 Water Conservation Measures remain in effect.*

Leaks

- ◆ Fix leaks, breaks and malfunctions in a reasonable time or 2 business days of notice. (Shutting off irrigation system during repairs constitutes a fix.)

Watering

- ◆ Watering is limited to no more than 2 days a week (Apr-Oct) and 1 day a week (Nov-Mar) except with a hand-held bucket/container, hand-held hose with automatic shut-off nozzle or very low-flow drip irrigation system.

Pools/Ponds

- ◆ No filling or re-filling residential pools and spas; maximum refill is 1 foot per month. Exempt: residents who inform District of medical use.

- ◆ No filling or re-filling ornamental lakes and ponds except if they sustained significant aquatic life prior to the declared water shortage.

Hosing/Washing

- ◆ No hosing or washing down vehicles. Use a commercial car wash that recycles the wash water, or commercial mobile detailer that uses own water supply.

Golf Courses

- ◆ Golf courses must irrigate with recycled water (given cost-effective, reasonable conversion time)

The Board may:

- ◆ Require high water users (10,000+ annual billing units) to develop water conservation plans and progress reports.
- ◆ Establish a water allocation program; increase water rates and/or implement percentage water-use reduction for commercial customers.

LEVEL 3 WATER SHORTAGE REQUIREMENTS (mandatory)
Water Supply Emergency

*The Board may declare a **Water Emergency** when the District experiences more than a 40% reduction in imported water supplies. Permanent, Supplemental, Level 1 & Level 2 Conservation Measures remain in effect.*

Leaks

- ◆ Fix leaks, breaks and malfunctions in a reasonable time or 1 business day of notice. (Shutting off irrigation system during repairs constitutes a fix.)

Watering

- ◆ All watering is prohibited except to maintain existing vegetation using a hand-held bucket/container, hand-held hose with automatic shut-off nozzle or very-low-flow drip irrigation system. Some exemptions.
- ◆ No new potable water service or water meters or will-serve letters. Some exemptions.

The Board may:

- ◆ Require high water users (10,000+ annual billing units) to develop water conservation plans and progress reports.
- ◆ Establish a water allocation program; increase water rates; and/or implement percentage water-use reduction for commercial customers.

Ordinance No. 206

SOUTH COAST WATER DISTRICT ORDINANCE NO. 206

AN ORDINANCE OF THE BOARD OF DIRECTORS OF SOUTH COAST WATER DISTRICT ESTABLISHING A WATER CONSERVATION & WATER SUPPLY SHORTAGE PROGRAM FOR USERS OF POTABLE WATER PROVIDED BY THE DISTRICT

Section I. Title

South Coast Water District Water Conservation & Water Supply Shortage Ordinance ("Ordinance")

Section II. Findings

1. **A reliable minimum supply of potable water is essential** to the public health, safety and welfare of the people and economy of Southern California.
2. **Southern California is a semi-arid region, largely dependent on imported water** supplies from Northern California and the Colorado River. Population growth, drought, climate change, environmental concerns, government policy changes, restrictions on pumping and other factors in our region, in other parts of the State and in the western U.S. make Southern California highly-susceptible to water supply reliability issues.
3. **Careful water management requires active conservation measures** not only in times of drought but at all times. It is essential to ensure a reliable minimum supply of water to meet current and future water supply needs.
4. **California Constitution Article X, Section 2** declares for the general welfare:
 - a. Water resources be put to beneficial use
 - b. Prevention of water waste and unreasonable water use or methods of water use
 - c. Full exercise of water conservation with a view to reasonable and beneficial water use

5. **California Water Code Section 375** authorizes water suppliers to adopt and enforce a comprehensive water conservation program to reduce potable water consumption and conserve supplies. Section 375 requires a noticed public meeting and public hearing.
6. **California Water Code Section 31027** sets forth the public notification requirements for water providers adopting requirements by ordinance.
7. **California Water Code Sections 350, et. seq.**, set forth the determination and notification procedures for water suppliers seeking to declare a water shortage emergency condition.
8. **California Water Code Section 356** allows for the adoption of regulations and restrictions that include discontinuance of service as an enforcement option where a water shortage emergency condition has been declared.
9. **California Water Code Section 377** authorizes water suppliers to enforce a comprehensive water conservation program by declaring that violations of adopted programs constitute misdemeanor violations.
10. **Health and Safety Code Section 5471** authorizes the District to apply charges or fees to persons or entities for services and facilities provided by the District, including, but not limited to, fees and charges for recovery of administrative and enforcement costs.
11. **California Water Code Section 370, et. seq.**, authorizes water suppliers to adopt water allocation programs for water users and allocation-based water conservation pricing.
12. **California Water Code Sections 13550 and 13551** declare a statewide policy that the use of potable domestic water for irrigation purposes when reclaimed (recycled) water is available constitutes a waste or unreasonable use of water within the meaning of the State Constitution.
13. **South Coast Water District Resolution No. 23-85/86** requires that future developments utilize reclaimed (recycled) water wherever economically and technically feasible within the boundaries of the District in order to conserve potable water for the purposes of human consumption and fire protection.
14. **The adoption and enforcement of a Water Conservation & Water Supply Shortage Ordinance is necessary to manage the District's potable water supply** short- and long-term and to minimize and/or avoid the effects of drought and water shortage within the District. Such a program is essential to ensure a reliable and sustainable minimum supply of water for public health, safety and welfare.

Section III. Declaration of Purpose and Intent

1. **To minimize or avoid the effect and hardship of potential shortages of potable water** to the greatest extent possible, this Ordinance establishes a Water Conservation & Water Supply Shortage Program designed to:
 - a. **Reduce potable water consumption** (demand) through conservation
 - b. **Enable effective potable water** supply planning
 - c. **Assure reasonable and beneficial use** of potable water
 - d. **Prevent waste of potable water** and maximize efficient use in the District
2. **The Ordinance establishes:**
 - a. **Permanent water conservation standards** designed to alter behaviors related to potable water-use efficiency during non-shortage conditions.
 - b. **Voluntary water conservation measures** designed to supplement permanent standards in the face of potential/planned water shortages.
 - c. **Three levels of potential response to escalating water supply shortages** which the South Coast Water District Board may choose to implement during times of declared water shortage or water emergency. The three levels of response consist of increasing water use restrictions as a result of worsening drought conditions, emergencies, and/or decreasing supplies.

Section IV. Definitions

1. General Definitions

- a. **"The District"** means South Coast Water District.
- b. **"The Board"** means the South Coast Water District Board of Directors.
- c. **"Person"** means any person or persons, corporation, public or private entity, governmental agency or institution, or any other user of water provided by the District.
- d. **"Potable Water"** means water that is suitable for drinking.
- e. **"Recycled Water"** means the reclamation and reuse of non-potable water and/or wastewater for beneficial use, such as irrigation. Also known as "Reclaimed Water."

- f. **"Water Waste"** refers to uses of water that are limited or prohibited under the Ordinance because they exceed necessary or intended use and could reasonably be prevented, such as runoff from outdoor watering.
- g. **"Billing Unit"** is equal to 100 cubic feet (1 CCF) of water, which is 748 gallons. Water use is measured in units of 100-cubic-feet and multiplied by applicable water usage rates for billing. Also known as a "Unit of Water."
- h. **"Undue Hardship"** is a unique circumstance in which a requirement of the Ordinance would result in a disproportionate impact on a water user or property upon which water is used compared to the impact on water users generally or similar properties or classes of water use.
- i. **"Base water supply"** refers to the District's average annual wholesale water purchases over the three-year period set by Metropolitan Water District for member agencies, i.e., 2004, 2005, 2006.

2. Irrigation-Related Definitions

- a. **"Automatic Shut-Off Nozzle"** refers to a water-efficient nozzle for use with residential or commercial hoses that must be pressed to start or stop the flow of water. Also known as a "Positive Self-Closing Shut-Off Nozzle."
- b. **"Irrigation Controller"** is the part of an automated irrigation system that instructs the valves to open and close to start or stop the flow of water.
 - 1. **"Sensor-based irrigation controller"** operates based on input from a combination of sensors (rain, solar, soil moisture) installed in or around the landscaped area.
 - 2. **"Weather-based irrigation controller"** operates automatically based on evapo-transpiration rates and historic or real-time weather data.
- c. **"Irrigation System"** refers to a manual or automated watering system consisting of pipes, hoses, spray heads and/or sprinkler devices or valves. Also known as a "Landscape Irrigation System."
- d. **"Minimal Irrigation Water Flow or Runoff"** is exceeded when water flows into the street **and** enters the nearest storm drain. Minimal levels of irrigation water flow or runoff would include water that tops the curb, flows into the gutter, but does not enter the storm drain.
- e. **"Positive Self-Closing Shut-Off Nozzle"** refers to a water-efficient nozzle for residential or commercial hoses that users must press or release to start or stop the flow of water. Also known as an "Automatic Shut-Off Nozzle."

- f. **"Valves"** refer to the part of an irrigation system that opens and closes manually or electronically to start or stop the flow of water.

3. Other Definitions

- a. **"Pre-Rinse Kitchen Spray Valves"** refer to highly water-efficient sprayers that commercial kitchens use to rinse dishes in the sink before washing and for other preliminary cleaning purposes.
- b. **"Single-Pass Cooling System"** refers to an air conditioning, refrigeration or other cooling system that removes heat by transferring it to a supply of clean water and dumping the water down the drain – after a single use. This type of cooling system is extremely water-inefficient compared to systems that re-circulate the water.

Section V. Application of Ordinance

1. **Ordinance provisions apply to any person or entity using potable water provided by the District.** This includes individuals, persons, corporations, public or private entities, governmental agencies or institutions, or any other users of District water.
2. **The provisions of the Ordinance may not apply to the following:**
 - a. **Water use necessary to protect public health and safety** or for essential government services, such as police, fire and similar services.
 - b. **Recycled water use for irrigation.**
 1. Use of recycled water requires a permit that has specific use restrictions, many of which focus on water efficiency.
 2. Given recycled water permit restrictions and interest in promoting recycled water as a means to preserve potable water, **recycled water is exempt from all requirements of this Ordinance.**
 - c. **Water used by commercial nurseries and growers** to sustain plants, trees, shrubs, crops or other vegetation intended for commercial sale.
3. **This Ordinance is intended solely to further the conservation of potable water.**
 - a. It is **not intended** to implement any provision of federal, state or local statutes, ordinances or regulations relating to protection of water quality or control of drainage or runoff.
 - b. Refer to the Regional Water Quality Control Board or local jurisdiction for information on storm water ordinances or management plans. Note: For local requirements regarding proper containment of water in the street, refer to local municipal codes.

Section VI(A): Permanent Water Conservation Measures

The following Permanent Mandatory Water Conservation Measures for potable water are in effect at all times, whether or not there is a water supply shortage or emergency.

1. General Restrictions – Residential, Commercial and Public Customers

a. Limits on Watering Hours

1. Watering or irrigating is **prohibited** any day of the week between **9:00 a.m. and 5:00 p.m.**
2. This applies to lawns, landscaping and all other vegetated areas.
3. The week includes weekdays and weekends, seven (7) days.
4. The following are **exempt** from this restriction:
 - a. Watering with a hand-held bucket or similar container
 - b. Watering with a hand-held hose equipped with a positive self-closing nozzle
 - c. Adjusting or repairing an irrigation system for very short periods of time
5. Outdoor watering cannot result in runoff that exceeds "minimal" levels. Minimal levels are exceeded when water enters the street **and** flows into the nearest storm drain. (See Permanent Water Conservation Measure VI(A) 1.c.)

b. Limits on Watering Duration

1. Watering or irrigating with a device or system that is not continuously attended is limited to **no more than 10 minutes per valve per cycle.**
2. This applies to lawns, landscaping and all other vegetated areas.
3. The following irrigation systems are **exempt**:
 - a. Very low-flow drip-type systems where no emitter discharges more than two (2) gallons of water per hour
 - b. Systems equipped with weather-based controllers
4. Outdoor watering cannot result in runoff that exceeds "minimal" levels. Minimal levels are exceeded when water enters the street **and** flows into the nearest storm drain. (See Permanent Water Conservation Measure VI(A) 1.c.)

c. Minimal Water Flow or Runoff from Irrigation: It is prohibited to water lawns, landscaping and vegetated areas in a manner that causes or allows more than a minimal amount of water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter, ditch or other property.

1. Water flow or runoff shall exceed "minimal" levels when the water enters the street **and** flows into the nearest storm drain.
2. Minimal levels of water flow or runoff would include irrigation water that tops the curb, flows into the gutter, but does not enter the storm drain.

d. Turn Off Irrigation Systems When It Rains

1. **New residential** automated irrigation systems must be equipped with:
 - a. Rain sensors that shut off the system when it rains, **or**
 - b. Smart controllers or evapo-transpiration sensors that use weather-based data to set efficient watering schedules, **or**
 - c. Manual control of the on/off function

e. Fix Leaks, Breaks or Malfunctions in lines, fixtures or facilities

1. Excessive use, loss or escape of water through breaks, leaks or malfunctions in the user's plumbing, distribution or irrigation system:
 - a. Is prohibited for any period of time after such water waste should have reasonably been discovered and corrected
 - b. Must be corrected in **no more than five (5) calendar days of District notification** – unless other arrangements are made with the District
2. Turning off an irrigation system during repairs constitutes a fix.
3. If water is being actively discharged and the owner cannot be contacted, the District may perform a temporary shut down.

f. No Hosing or Washing Down Hard or Paved Surfaces

1. It is **prohibited** to hose or wash down hard or paved surfaces, such as sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys.
2. When it is necessary hose or wash down hard or paved surfaces to alleviate safety or sanitary hazards, the following may be used:

- a. Hand-held bucket or similar container
 - b. Hand-held hose equipped with a positive self-closing nozzle
 - c. Low-volume high-pressure cleaning machine, preferably equipped to recycle used water
- 3. Note: For local requirements regarding proper containment of water in the street, refer to local municipal codes.
- g. **No Hosing or Washing Down Vehicles:** It is **prohibited** to use water to hose or wash down a motorized or non-motorized vehicle, including but not limited to automobiles, trucks, vans, buses, motorcycles, boats or trailers.
 - 1. The following are **exempt** from this restriction:
 - a. Use of a hand-held bucket or similar container
 - b. Use of a hand-held hose equipped with a positive self-closing nozzle
 - c. Commercial car washing facility
 - d. Commercial mobile detailers using their own source of water
 - 2. Note: For local requirements regarding proper containment of water in the street, refer to local municipal codes.
- h. **Re-Circulating Decorative Water Fountains and Features:** Effective January 1, 2011, all decorative water fountains and water features must re-circulate water – or users must secure a waiver from the District.
- i. **Retrofit of Plumbing Fixtures by Prospective Account Holder Upon Sale or Transfer of Property**
 - 1. Effective January 1, 2011, any request for new water service associated with the sale or transfer of property shall require the prospective account holder to demonstrate – **prior to the District's initiating service -- that all existing plumbing fixtures on the property are retrofitted exclusively with water-conserving fixtures, such as:**
 - a. Low-flow or high efficiency toilets (i.e., 1.6 gallons or less per flush)
 - b. Low-flow showerheads (e.g., rated at maximum of 2.5 gallons per minute at 80 psi)
 - c. Aerators for kitchen and bath faucets (e.g., rated maximum of 2.5 gallons per minute at 80 psi)
 - d. Irrigation controllers with rain-shut off feature (not necessarily "smart controllers")

j. Unauthorized Use of Fire Hydrants Prohibited

1. **No person may use water from any fire hydrant** for any purpose other than fire suppression or emergency aid without first:

- a. Requesting and posting the appropriate fees at the District.
- b. Obtaining a hydrant meter to record all water consumption for a specified project. Failure to obtain a hydrant meter may result in fees associated with water theft and meter tampering, as deemed appropriate.

2. Commercial Dedicated Potable Irrigation Systems -- Turn off Irrigation Systems when it Rains

- a. As of **July 1, 2010**, **new and existing** commercial dedicated potable irrigation systems must be equipped with:

1. Rain sensors that shut off the system when it rains, **or**,
2. Smart controllers or evapo-transpiration sensors that use weather-based data to set efficient watering schedules, **or**,
3. Manual control of the on/off function

3. Commercial Food-Serving & Lodging Requirements

- a. **Water Served Only Upon Request.** Eating or drinking establishments, including but not limited to restaurants, hotels, cafes, bars or other public places where food or drinks are sold, or served or offered for sale, are prohibited from providing drinking water to any person unless requested.
- b. **Option Not To Launder Towels & Linens.** Hotels, motels and other commercial lodging establishments must provide guests the option of not having used towels and linens laundered. Lodging establishments must prominently display notice of this option in each room and/or bathroom, using direct and straightforward language that is easy to understand.

3. Commercial Kitchen Requirements

- a. **Water-Efficient Pre-Rinse Kitchen Spray Valves.** Food preparation establishments, such as restaurants, cafes and hotels, are prohibited from using non-water efficient kitchen spray valves, as follows:
 1. **New** kitchen spray valves must use 1.6 gallons or less per minute.
 2. Effective **January 1, 2010**, **existing** kitchen spray valves must be retrofitted to models using 1.6 gallons of water or less per minute.

- b. **Best-Available Water-Conserving Technology.** All water-using equipment in new or remodeled commercial kitchens must use the best-available, water-conserving technology. See examples cited on the California Urban Water Conservation Council (CUWCC) website for examples.
- c. **Scoop Sinks.** Scoop sinks shall be set at minimum water flow at all times of use and shut off during non-working hours.
- d. **Automatic Shut-Off Hose Nozzles.** When hosing or washing kitchen or garbage areas or other areas for sanitary reasons as required by the Health Dept., hoses shall be equipped with positive self-closing nozzles.

4. Commercial Water Recirculation Requirements

a. Car Wash and Laundry System Requirements:

- 1. All new commercial car-wash and laundry facilities and systems must re-circulate the wash water – or secure a waiver of this requirement from the District.
- 2. All existing commercial car-wash facilities shall retrofit to systems that re-circulate wash water by January 1, 2012.

- b. **No Single-Pass Cooling Systems:** Buildings requesting new water service or being remodeled are prohibited from installing single-pass systems.

5. Recycled Water To Replace Potable Water Use

- a. **New Water Service:** Prior to the connection of any new water service, the District will determine whether recycled water is appropriate and available to meet the requirements of the new service request.
- b. **Recycled water** must be utilized to the maximum extent feasible, as determined by the District, and as required by state policy.
- c. **Transition from Potable Water:** The District may prohibit the use of potable water in certain instances – if the District determines that a specified use for potable water could be achieved with recycled water as a cost-effective alternative and if the customer is given a reasonable time to make the conversion.

6. Construction Site Requirements

- a. **Recycled or non-potable water** must be used, when available.
- b. **No potable water may be used for soil compaction or dust control** where there is a reasonably-available source of recycled or non-potable water approved by the Dept. of Public Health and appropriate for such use.

- c. **Water hoses shall be equipped with automatic shut-off nozzles**, given such devices are available for the size and type of hoses in use.
- 7. **Indiscriminate Water Use.** Upon notice by the District, persons shall cease to cause or permit the indiscriminate use of water not otherwise prohibited above which is wasteful and without reasonable purpose.
- 8. **Public Health and Safety.** These regulations shall not be construed to limit water use which is immediately necessary to protect public health and/or safety.

Section VI(B): Supplemental Conservation Measures – Water Supply Watch

Declaration of a Water Supply Watch may be considered when there is a potential or planned shortage in imported water supplies to the District and/or the District deems a reduction in consumer usage desirable due to existing water conditions.

1. Water Supply Watch -- Supplemental, Voluntary Conservation Measures

- a. A Water Supply Watch exists when the District Board of Directors, at its sole discretion, determines that it is desirable to:
 - 1. Put the public on notice of a potential or planned water shortage that could result in reduced imported water supplies to the District
 - 2. Encourage the public to supplement year-round, mandatory water conservation measures with voluntary conservation measures focused on outdoor water-use efficiency.
- 2. **Mandatory Permanent Water Conservation Measures** identified in Section VI(A) remain in effect.
- 3. **Voluntary Water Supply Watch Measures take effect** upon Board declaration:
 - a. **Water-efficient irrigation systems and practices**
 - 1. Closely monitor irrigation systems for leaks, breaks and malfunctions
 - 2. Utilize water-efficient irrigation practices and devices, such as smart timer and evapo-transpiration controllers; stream rotor nozzles; proper amounts of fertilizer; mulch.
 - 3. Adjust irrigation controllers as the weather changes.
 - 4. Replace irrigation controller batteries in the spring and fall.
 - 5. Use soil probes to assess moisture depth and optimize root irrigation.
 - 6. Consider installation of drip irrigation systems.
 - 7. Target 40 psi to 60 psi for water pressure.

b. **California-friendly vegetation (native, drought-tolerant, fire-resistant)**

1. Consider planting California-friendly vegetation.
2. Consider replacing at least a portion of existing turf with California-friendly vegetation.

c. **Cover outdoor pools, spas and water features to minimize evaporation.**

Section VII: Level 1 Water Shortage – Water Supply Alert

Declaration of a Level 1 Water Supply Alert may be considered when the District experiences up to a 20% shortage in imported water supplies and/or determines the need to further reduce consumer usage by up to 20%.

1. Level 1 Water Supply Alert

- a. A Level 1 Water Supply Alert exists when the District Board of Directors, at its sole discretion, determines that a reduction in consumer usage is necessary to make more efficient use of limited water and appropriately respond to existing water conditions.
 - b. The type of event that may prompt the Board to declare a Level 1 Water Supply Alert could include, among other factors, a finding that its **wholesale water provider has allocated no more than 80% of the District's base water supply.**
2. Mandatory Permanent Water Conservation Measures identified in Section VI(A) remain in effect.
3. **Mandatory Level 1 Water Conservation Measures take effect** upon declaring a Level 1 Water Supply Shortage and apply for the duration of the shortage:

a. Limits on Watering Days

1. No more than **three (3) days per week from April – October**
2. No more than **one (1) day per week from November – March.**

- a. This applies to lawns, landscaping, and all vegetated areas.
- b. The week includes weekdays and weekends, seven (7) days.
- c. The District will establish/post the new watering schedules.

3. The following are **exempt** from these restrictions:

- a. Watering with a hand-held bucket or similar container
- b. Watering with a hand-held hose equipped with a positive self-closing nozzle

- c. Irrigation systems that exclusively use very-low-flow drip type systems where emitters discharge no more than two (2) gallons of water per hour.
- b. **Shorter Timeframe to Fix Leaks, Breaks or Malfunctions** in water users' pipelines, fixtures or facilities.
 - 1. **Excessive use**, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing, distribution or irrigation system:
 - a. Is prohibited for any period of time after such water waste should have reasonably been discovered and corrected
 - b. Must be corrected in **no more than (3) business days of District notification** – unless other arrangements are made with the District
 - 2. Turning off an irrigation system during repairs constitutes a fix.
 - 3. If water is being actively discharged and the owner cannot be contacted, the District may perform a temporary shut down.
- c. **During Level 1, Level 2 and/or Level 3** water supply conditions, the Board of Directors, at its sole discretion and by written request, **may implement Water Conservation Plans for High Water Users.**
 - 1. **Water Conservation Plans for High Water Users**
 - a. Residential, public and commercial customers (including dedicated potable water irrigators) may be required to develop Water Conservation Plans at the District's discretion.
 - b. The requirement would be triggered by annual water usage of **10,000 billing units or more** at the District's discretion.
 - c. The District could conduct and/or oversee on-site assessments of water use as a first step in plan development.
 - d. Customers identified for plan development would:
 - 1. Submit a Water Conservation Plan based on a standard plan outline and criteria from the District.
 - 2. Recommend increased water savings, e.g., potential use of recycled water, as determined by the District.
 - 3. Work interactively with staff in developing the plan
 - 4. Provide regular progress reports to the District on the status of implementing recommendations. The District Manager would determine the frequency of reports.
- 4. **Other Prohibited Uses:** The District may implement other prohibited water uses as deemed necessary, after notice to customers.

Section VIII: Level 2 Water Shortage – Water Supply Warning

Declaration of a Level 2 Water Supply Warning may be considered when the District experiences up to a 40% shortage in imported water supplies and/or determines the need to further reduce consumer usage by up to 40%.

1. Level 2 Water Supply Warning

- a. A Level 2 Water Supply Warning exists when the District Board of Directors, at its sole discretion, determines that a further reduction in consumer usage is necessary to make more efficient use of limited water and appropriately respond to water conditions.
 - b. The type of event that **may** prompt the Board to declare a Level 2 Water Supply Warning could include, among other factors, a finding that its **wholesale water provider allocated no more than 60%** of the District's base water supply.
2. The following **mandatory water conservation measures remain in effect** during a Level 2 Water Supply Warning:
- a. Permanent Water Conservation Measures identified in Section VI
 - b. Level 1 Water Conservation Measures identified in Section VII
3. The following **water conservation measures will take effect** upon declaration of a Level 2 Water Supply Warning and apply for the duration of the water shortage:
- a. **Additional Limits on Watering Days**
 1. No more than **two (2) days per week from April – October**
 2. No more than **one (1) day per week from November – March.**
 - a. This applies to lawns, landscaping and vegetated areas.
 - b. The week includes weekdays and weekends, seven (7) days.
 - c. The District will establish/post the new watering schedules.
 3. The following are **exempt** from these restrictions:
 - a. Watering with a hand-held bucket or similar container
 - b. Watering with a hand-held hose equipped with a positive self-closing nozzle
 - c. Irrigation systems that exclusively use very low-flow drip-type systems where emitters discharge no more than two (2) gallons of water per hour.

b. **Shorter Timeframe to Fix Leaks, Breaks or Malfunctions** in water users' pipelines, fixtures or facilities.

1. **Excessive use**, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing, distribution or irrigation system:
 - a. Is prohibited for any period of time after such water waste should have reasonably been discovered and corrected
 - b. Must be corrected in **no more than two (2) business days of District notification** – unless other arrangements are made with the District
2. Turning off an irrigation system during repairs constitutes a fix.
3. If water is being actively discharged and the owner cannot be contacted, the District may perform a temporary shut down.

c. **No Filling or Refilling Ornamental Lakes and Ponds**

1. Filling or refilling ornamental lakes and ponds is prohibited.
2. **Exempt** are ornamental lakes and ponds that sustain aquatic life – provided such life is of significant value and was actively managed in the water feature prior to declaring the shortage.

d. **No Filling or Refilling Residential Pools or Spas**

1. Filling residential swimming pools or outdoor spas is prohibited.
2. The operational water level in a pool or spa may be maintained by re-filling it once a month with no more than one (1) foot of water.
3. **Exempt** are individuals who, due to health reasons or medical conditions and upon notice to the District, find it necessary to fill or refill their pools or spas.

e. **No Hosing or Washing Down Vehicles:** It is **prohibited** to use water to hose or wash down a motorized or non-motorized vehicle, including but not limited to automobiles, trucks, vans, buses, motorcycles, boats or trailers.

1. The only **exemptions** from this Level 2 restriction are:
 - a. Washing vehicles at a commercial car washing facility that recycles its wash water
 - b. Washing vehicles using a commercial mobile detailer that uses its own source of water

2. Note: For local requirements regarding proper containment of water in the street, refer to local municipal codes.

f. **Golf Courses Required to Irrigate with Recycled Water**

1. If the District determines that it is a cost-effective alternative
2. If the customer is given a reasonable amount of time to make the conversion, as determined by the District Manager.

g. **Other Prohibited Uses:** The District may implement other prohibited water uses as deemed necessary, following notification of customers.

h. **During Level 1, Level 2 and/or Level 3** water supply conditions, the Board of Directors, at its sole discretion and by written request, may implement **Water Conservation Plans for High Water Users**. (See Section VII.3.c.1 for description).

i. **During Level 2 and/or Level 3** water supply conditions, the Board of Directors, at its sole discretion, may implement one or more of the following additional conservation requirements:

1. **Water Allocation or Budget Program**

- a. The District Board of Directors, at its sole discretion, may establish water allocations or water budgets for properties served by the District starting with a Level 2 Water Supply Warning – using a method that does not penalize persons for either the implementation of the conservation method or installation of water-saving devices.
- b. Following the effective date of a water allocation or budget program, any person using water in excess of the allocation or budget will be subject to a penalty as determined by the District rate schedule.
- c. The penalty for excess water use will be cumulative to any other remedy or penalty imposed for violation of this Ordinance.

2. **Increased Water Usage Rates:** The District Board of Directors, at its sole discretion, may increase water usage rates, other than single-family residential Tier 1 rates, by an amount deemed necessary, as determined by the District's rate schedule.

3. **Percentage Water-Use Reduction for Commercial Customers:** The District Board of Directors, at its sole discretion, may require commercial customers to reduce water use by a certain percentage, as determined by the District.

Section IX. Level 3 Water Shortage – Water Supply Emergency

Declaration of a Level 3 Water Supply Emergency may be considered when the District experiences more than a 40% shortage in imported water supplies and/or determines the need to further reduce consumer usage by more than 40%.

1. Level 3 Water Supply Emergency

- a. A Level 3 Water Supply Emergency exists when the District Board of Directors, at its sole discretion, determines that a further reduction in consumer usage is necessary to make more efficient use of limited water and appropriately respond to existing water conditions.
- b. The type of event that **may** prompt the Board to declare a Level 3 Water Emergency could include, among other factors, a finding that its **wholesale water provider allocated less than 40% of the District's base water supply.**

2. The following mandatory water conservation measures will remain in effect:

- a. **Permanent Water Conservation Measures** identified in Section VI
- b. **Level 1 Water Conservation Measures** identified in Section VII
- c. **Level 2 Water Conservation Measures** identified in Section VIII

3. The following mandatory conservation measures take effect upon declaring a Level 3 Water Supply Emergency and apply for the duration of the Emergency:

a. All Watering Prohibited

1. Watering is prohibited on any day at any time.

- a. This applies to lawns, landscaping and vegetated areas.
- b. The District will post the no- watering restriction.

2. This restriction does not apply to the following categories of use unless the District has determined that recycled water is available and may be lawfully applied to the use:

a. Maintenance of vegetation, trees and shrubs using:

1. A hand-held bucket or similar container
2. A hand-held hose equipped with a positive self-closing nozzle
3. Irrigation systems that exclusively use very-low-flow drip type systems where emitters discharge no more than two (2) gallons of water per hour, subject to hour restrictions in Sect. VI(A)1.a.

b. Maintenance of the following, subject to hour restrictions in Sect. VI(A)1.a:

1. Existing landscaping necessary for fire protection and/or soil erosion control
2. Plant materials identified as rare or essential to the well being of endangered/rare species
3. Public works projects and actively-irrigated environmental mitigation projects

b. **Shorter Timeframe to Fix Leaks, Breaks or Malfunctions** in lines, fixtures, and facilities.

1. Excessive use, loss or escape of water through breaks, leaks or malfunctions in the user's plumbing, distribution or irrigation system:
 - a. Is prohibited for any period of time after such water waste should have reasonably been discovered and corrected
 - b. Must be **corrected in no more than one (1) calendar days** of District notification – unless other arrangements are made with the District
2. Turning off an irrigation system during repairs constitutes a fix.
3. If water is being actively discharged and the owner cannot be contacted, the District may perform a temporary shut down.

c. **No New Potable Water Service**

1. During a Level 3 Water Emergency, the District will **not provide:**
 - a. New potable water service
 - b. New water meters (temporary or permanent)
 - c. Will-serve letters
2. The District will **only issue** will-serve letters in the following cases:
 - a. Projects necessary to protect public health, safety & welfare
 - b. Projects that have a valid, unexpired City building permit
 - c. Projects in which applicants can provide -- to the satisfaction of the District -- substantial evidence of an enforceable commitment that water demands will be offset prior to the provision of a new water meter(s)
3. This prohibition **does not preclude** resetting or turning-on meters to restore or continue water service interrupted for one year or less.

- d. During **Level 1, Level 2 and/or Level 3** water supply conditions, the Board of Directors, at its sole discretion and by written request, may implement **Water Conservation Plans for High Water Users**. (See Section VII.3.c.1).
- e. During **Level 2 and/or Level 3** water supply conditions, the Board of Directors, at its sole discretion, may implement one or more of the following additional conservation requirements. (See Section VII.3.g):
 - 1. **Water Allocation or Budget Program**
 - 2. **Increased Water Usage Rates**
 - 3. **Percentage Water-Use Reduction for Commercial Customers**
- 4. **Discontinue Service:** Per Water Code Section 356, the District, in its sole discretion, may discontinue service to customers who willfully violate Section IX provisions.
- 5. **Other Prohibited Uses:** The District may implement other prohibited water uses as deemed necessary, following notification of customers

Section X. Declaration & Notification of Water Shortages/Emergencies

- 1. **Declaration of Level 1 or Level 2 Water Shortage:** The Board of Directors may declare a Level 1 or Level 2 Water Shortage and adopt a water shortage resolution at a regular or special public meeting in accordance with State law.
- 2. **Declaration of Level 3 Water Supply Emergency:** The Board of Directors may declare a Level 3 Water Supply Emergency in accordance with the procedures specified in Water Code Sections 351 and 352. Thereafter, penalties and violations under Section XIII.2 shall apply.
- 3. **Notification of Declared Level 1, Level 2 or Level 3 Water Supply Condition:** The District must **publish a copy of resolution** declaring the water supply shortage or emergency in a newspaper used for the publication of official notices within the jurisdiction of the District within **ten (10) days** of the date that the shortage/emergency level is declared. Additional mandatory conservation requirements will **take effect on the fifteenth (15th) day** after the date that the shortage level is declared.
- 4. **Notification of Declared Water Allocation or Water Budget Program:** If the Board of Directors implements a water allocation or water budget program during a Level 2 or Level 3 Water Shortage, the District will provide **notice of the program** to customers via U.S. mail, other mailings in which the District customarily sends billing statements, automated calling and/or e-mail outreach. The program will take effect on the date of the notification mailing or at such later date as specified in the notice.

Section XI. Hardship Waiver

1. **Undue and Disproportionate Hardship:** If, due to unique circumstances, a specific requirement of the Ordinance would result in undue hardship to a person using water or to property upon which water is used, that is disproportionate to the impacts to water users generally or to similar property or classes of water users, then the person may apply for a waiver.
2. **Written Finding:** The waiver may be granted or conditionally granted only upon a written finding of the existence of facts demonstrating an undue hardship.
3. **Application for a Waiver:** Application for a waiver must be on a form prescribed by the District and accompanied by a non-refundable processing fee in an amount in accordance with the District's standards.
4. **Supporting Documentation:** The application must be accompanied by photographs, maps, drawings, and other information, including a written statement of the applicant.
5. **Required Findings for Waiver:** Based on the information and supporting documents provided in the application, additional information provided as requested, and water use information for the property as shown by the records of the District, the General Manager in making the waiver determination will take into consideration the following:
 - a. That the waiver does not constitute a grant of special privilege inconsistent with the limitations upon other residents and businesses;
 - b. That because of special circumstances applicable to the property or its use, the strict application of this Ordinance would have a disproportionate impact on the property or use that exceeds the impacts to residents and businesses generally;
 - c. That the authorizing of such waiver will not be of substantial detriment to adjacent properties, and will not materially affect the ability of the District to effectuate the purpose of this Ordinance and will not be detrimental to the public interest; and
 - d. That the condition or situation of the subject property or the intended use of the property for which the waiver is sought is not common, recurrent or general in nature.
6. **Approval Authority:** The General Manager or his designee(s) must act upon any completed Application for a Waiver no later than ten (10) days after receipt and may approve, conditionally approve, or deny the waiver. The decision is final.
 - a. The applicant requesting the waiver must be promptly notified in writing of any action taken.
 - b. Unless specified otherwise, at the time a waiver is approved, it will apply to the subject property for the duration of the water supply shortage.

Section XII: Non-Compliance Charges and Penalties

1. Non-Compliance with Permanent, Level 1 or Level 2 Conservation Measures

- a. The following will apply to persons or entities that fail to comply with any provision of the Ordinance for Permanent, Level 1 or Level 2 mandatory water conservation measures.
 1. **First Instance of Non-Compliance:** The District will issue a **written warning** and send it and a copy of the Ordinance by mail.
 2. **Second Instance of Non-Compliance:** A second instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **one hundred dollars (\$100)**.
 3. **Third Instance of Non-Compliance:** A third instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **two hundred and fifty dollars (\$250)**
 4. **Fourth and Subsequent Instances of Non-Compliance:** A fourth or any subsequent instance of non-compliance with this Ordinance is punishable by a non-compliance charge not to exceed **five hundred dollars (\$500)**.
- b. **Misdemeanor:** Pursuant to water Code Section 377, any instance of non-compliance with the Ordinance may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than thirty (30) days or by a fine not exceeding one thousand dollars (\$1,000) or by both.
- c. **Separate Offenses:** Each day that a person or entity is non-compliant with the Ordinance is a separate offense.

2. Non-Compliance with Level 3 Water Supply Emergency Conservation Measures

- a. **Non-Compliance Charges:** The following will apply to persons or entities failing to comply with any provision of the Ordinance for Level 3 mandatory water conservation measures:
 1. **First Instance of Non-Compliance:** The District will issue a **written warning** and send it and a copy of the Ordinance by mail.
 2. **Second Instance of Non-Compliance:** A second instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **two hundred and fifty dollars (\$250)**.

3. **Third Instance of Non-Compliance:** A third instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **five hundred dollars (\$500)**.

b. **Water Flow Restrictor and/or Termination of Service**

1. **Water Flow Restrictor Device:**

- a. In addition to any non-compliance charges, the District may install a water flow restrictor device, following **written notification of intent** to the customer.
- b. The device would in place for a minimum of forty eight (48) hours.

2. **Termination of Service:** In addition to any non-compliance charges and the installation of a water flow restrictor, the District may disconnect and/or terminate a customer's water service, pursuant to Water Code Section 356.

3. **Costs for Water Flow Restrictors and Service Disconnection**

- a. A person or entity in non-compliance with this Ordinance is responsible for:
 1. Payment of the District's charges for installing and/or removing any water flow restricting device, and
 2. Disconnecting and/or reconnecting service per the District's schedule of charges then in effect.
- b. The charge for installing and/or removing any flow restricting device must be paid to the District before it is removed. Nonpayment will be subject to the same remedies as nonpayment of basic water rates.
- c. **Misdemeanor:** Pursuant to Water Code Section 377, any instance of non-compliance with the Ordinance may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than thirty (30) days or by a fine not exceeding one thousand dollars (\$1,000) or by both.
- d. **Separate Offenses:** Each day that a person or entity is non-compliant with the Ordinance is a separate offense.

3. Appeal & Hearing Process: Notice of Non-Compliance, Hearing Determination

- a. **The District will issue a Notice of Non-Compliance** by mail or personal delivery at least ten (10) days before taking enforcement action. The notice will describe the violation and the date by which corrective action must be taken.
- b. **A customer may appeal the Notice of Non-Compliance** by filing a written Notice of Appeal with the District no later than the close of business on the day before the date scheduled for enforcement action. A customer appeal shall state the grounds for the appeal. Any Notice of Non-Compliance not timely appealed will be final.
 1. Upon receipt of a timely appeal, the District will schedule a **hearing on the appeal** and mail written notice of the hearing date to the customer at least ten (10) days before the hearing.
 2. The General Manager or his designee(s) will hear the appeal, make a Hearing Determination, and issue a written **Notification of Decision** within ten (10) days of the hearing.
- c. **A customer may appeal a Hearing Determination to the Board of Directors** by written request for a hearing within ten (10) days after the certified date of delivery or date of first class mailing of the Notification of Decision. The request shall state the grounds for appeal.
 1. At a public meeting, the Board shall **review the appeal** and, at its sole discretion, may affirm, reverse or modify the Hearing Determination.
 2. **The decision of the Board is final.**
- d. Pending receipt of a written appeal or pending a hearing pursuant to an appeal, the District **may take appropriate steps to prevent the unauthorized use of water** given the nature and extent of the violations and the current declared water shortage level condition, including restricting the level of water use until the appeal is heard.

Section XIII: Severability: If any section, subsection, sentence, clause or phrase in this Ordinance is for any reason held invalid, the validity of the remainder of the Ordinance will not be affected. The District Board of Directors hereby declares it would have passed this Ordinance and each section, subsection, sentence, clause or phrase thereof, irrespective of the fact that one or more sections, subsections, sentences, clauses, or phrases thereof is declared invalid.

PASSED and **ADOPTED** by the affirmative vote of a majority of the Board of Directors of the South Coast Water District at a Regular Meeting held April 23, 2009.

A handwritten signature in blue ink, reading "Richard DeBenedictis", written over a horizontal line.

President

ATTEST:

A handwritten signature in blue ink, reading "Michael P. Sauter", written over a horizontal line.

Secretary

SOUTH COAST WATER DISTRICT

Serving the Public Since 1932

Certification

I, Michael P. Dunbar, Secretary of the SOUTH COAST WATER DISTRICT, Orange County, California, do hereby certify that the foregoing **Ordinance No. 206** was duly adopted at a Regular Meeting of the Governing Board of said District, held on the 23rd day of April, 2009 by the following vote of members of the Board:

AYES: Dietmeier, Moore, McGuire, Rayfield and Gardner

NOES:

ABSENT:

ABSTAIN:

and I further certify that Richard Dietmeier, as President, and Michael P. Dunbar, as Secretary, signed and approved said **Ordinance No. 206** on the 23rd day of April, 2009.



Michael P. Dunbar
Secretary of the Board
South Coast Water District

(District Seal)

Appendix E

60 Day Notification Letters

SOUTH COAST



WATER DISTRICT

March 23, 2011

City of San Clemente
380 Avenida Pico, Bldg. J
San Clemente, CA 92672

Attention: Mr. Jay Elston
Utilities Operation Supervisor

**Subject: South Coast Water District
Urban Water Management Plan-2010**

Dear Mr. Elston,

As you may be aware, the South Coast Water District (SCWD), in accordance with the Water Code, updates its Urban Water Management Plan (UWMP) every five years. This effort helps ensure we can provide South Coast Water District customers who live in the City of San Clemente with a reliable supply of high-quality water to meet current and future demand. Because comprehensive water resource planning is so critical, the California Water Code now mandates all urban water purveyors notify the city or county they serve of this planning effort.

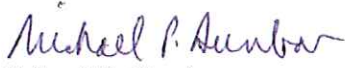
Developing a comprehensive 2010 Regional Urban Water Management Plan is critical to Southern California, the County of Orange and the City of San Clemente. The result of our collaborative efforts will be an all-inclusive plan that will assist us in better managing one of Southern California's most precious resources.

A draft of the SCWD 2010 UWMP will be available for review on our website at www.scwd.org by April 18, 2011. Public hearings are scheduled to be held on June 6, 2011 for plan discussion and June 23, 2011 for plan review and adoption.

We thank you in advance for your cooperation. If you have any questions or comments about our planning effort, please contact Larry Fregin at (949) 499-4555 ext. 3120 or me at (949) 499-4555.

Very truly yours,

South Coast Water District


Michael P. Dunbar
General Manager

cc: Mr. George Scarborough, City Manager, City of San Clemente

Mailing Address: P.O. Box 30205, Laguna Niguel, CA 92607-0205

Street Address: 31592 West Street, Laguna Beach, CA 92651

Fax: (949) 499-4256 Phone: (949) 499-4555

SOUTH COAST



WATER DISTRICT

March 23, 2011

City Dana Point
33282 Golden Lantern
Dana Point, CA 92629

Attention: Mr. Kyle Butterwick
Director of Community Development

**Subject: South Coast Water District
Urban Water Management Plan-2010**

Dear Mr. Butterwick,

As you may be aware, the South Coast Water District (SCWD), in accordance with the Water Code, updates its Urban Water Management Plan (UWMP) every five years. This effort helps ensure we can provide South Coast Water District customers who live in the City of Dana Point with a reliable supply of high-quality water to meet current and future demand. Because comprehensive water resource planning is so critical, the California Water Code now mandates all urban water purveyors notify the city or county they serve of this planning effort.

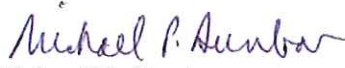
Developing a comprehensive 2010 Regional Urban Water Management Plan is critical to Southern California, the County of Orange and the City of Dana Point. The result of our collaborative efforts will be an all-inclusive plan that will assist us in better managing one of Southern California's most precious resources.

A draft of the SCWD 2010 UWMP will be available for review on our website at www.scwd.org by April 18, 2011. Public hearings are scheduled to be held on June 6, 2011 for plan discussion and June 23, 2011 for plan review and adoption.

We thank you in advance for your cooperation. If you have any questions or comments about our planning effort, please contact Larry Fregin at (949) 499-4555 ext. 3120 or me at (949) 499-4555.

Very truly yours,

South Coast Water District


Michael P. Dunbar
General Manager

cc: Mr. Doug Chotkevys, City Manager, City of Dana Point

Mailing Address: P.O. Box 30205, Laguna Niguel, CA 92607-0205

Street Address: 31592 West Street, Laguna Beach, CA 92651

Fax: (949) 499-4256 Phone: (949) 499-4555

SOUTH COAST



WATER DISTRICT

March 23, 2011

City of Laguna Beach
505 Forest Avenue
Laguna Beach, CA 92651

Attention: Mr. John Montgomery
Community Development Department

**Subject: South Coast Water District
Urban Water Management Plan-2010**

Dear Mr. Montgomery,

As you may be aware, the South Coast Water District (SCWD), in accordance with the Water Code, updates its Urban Water Management Plan (UWMP) every five years. This effort helps ensure we can provide South Coast Water District customers who live in the City of Laguna Beach with a reliable supply of high-quality water to meet current and future demand. Because comprehensive water resource planning is so critical, the California Water Code now mandates all urban water purveyors notify the city or county they serve of this planning effort.

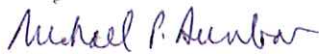
Developing a comprehensive 2010 Regional Urban Water Management Plan is critical to Southern California, the County of Orange and the City of Laguna Beach. The result of our collaborative efforts will be an all-inclusive plan that will assist us in better managing one of Southern California's most precious resources.

A draft of the SCWD 2010 UWMP will be available for review on our website at www.scwd.org by April 18, 2011. Public hearings are scheduled to be held on June 6, 2011 for plan discussion and June 23, 2011 for plan review and adoption.

We thank you in advance for your cooperation. If you have any questions or comments about our planning effort, please contact Larry Fregin at (949) 499-4555 ext. 3120 or me at (949) 499-4555.

Very truly yours,

South Coast Water District


Michael P. Dunbar
General Manager

cc: Mr. John Pietig City Manager, City of Laguna Beach

Mailing Address: P.O. Box 30205, Laguna Niguel, CA 92607-0205

Street Address: 31592 West Street, Laguna Beach, CA 92651

Fax: (949) 499-4256

Phone: (949) 499-4555

SOUTH COAST



WATER DISTRICT

March 23, 2011

South Orange County Wastewater Authority
34156 Del Obispo Street
Dana Point, CA 92629

Attention: Mr. Tom Rosales
General Manager

**Subject: South Coast Water District
Urban Water Management Plan-2010**

Dear Mr. Rosales,

As you may be aware, the South Coast Water District (SCWD), in accordance with the Water Code, updates its Urban Water Management Plan (UWMP) every five years. This effort helps ensure we can provide South Coast Water District customers who live in the Cities of Dana Point, Laguna Beach and San Clemente with a reliable supply of high-quality water to meet current and future demand. Because comprehensive water resource planning is so critical, the California Water Code now mandates all urban water purveyors notify the city or county they serve of this planning effort.


Developing a comprehensive 2010 Regional Urban Water Management Plan is critical to Southern California and Orange County. The result of our collaborative efforts will be an all-inclusive plan that will assist us in better managing one of Southern California's most precious resources.

A draft of the SCWD 2010 UWMP will be available for review on our website at www.scwd.org by April 18, 2011. Public hearings are scheduled to be held on June 6, 2011 for plan discussion and June 23, 2011 for plan review and adoption.

We thank you in advance for your cooperation. If you have any questions or comments about our planning effort, please contact Larry Fregin at (949) 499-4555 ext. 3120 or me at (949) 499-4555.

Very truly yours,

South Coast Water District


Michael P. Dunbar
General Manager

Mailing Address: P.O. Box 30205, Laguna Niguel, CA 92607-0205

Street Address: 31592 West Street, Laguna Beach, CA 92651

Fax: (949) 499-4256

Phone: (949) 499-4555

SOUTH COAST



WATER DISTRICT

March 23, 2011

County of Orange
Attn. Steve Dunivent, Deputy CEO
County of Orange
10 Civic Center Plaza
Santa Ana, CA 92701

Attention: Mr. Dunivent
Deputy CEO

**Subject: South Coast Water District
Urban Water Management Plan-2010**

Dear Mr. Dunivent,

As you may be aware, the South Coast Water District (SCWD), in accordance with the Water Code, updates its Urban Water Management Plan (UWMP) every five years. This effort helps ensure we can provide South Coast Water District customers who live in the County of Orange with a reliable supply of high-quality water to meet current and future demand. Because comprehensive water resource planning is so critical, the California Water Code now mandates all urban water purveyors notify the city or county they serve of this planning effort.

Developing a comprehensive 2010 Regional Urban Water Management Plan is critical to Southern California, the County of Orange and South Coast Water District. The result of our collaborative efforts will be an all-inclusive plan that will assist us in better managing one of Southern California's most precious resources.

A draft of the SCWD 2010 UWMP will be available for review on our website at www.scwd.org by April 18, 2011. Public hearings are scheduled to be held on June 6, 2011 for plan discussion and June 23, 2011 for plan review and adoption.

We thank you in advance for your cooperation. If you have any questions or comments about our planning effort, please contact Larry Fregin at (949) 499-4555 ext. 3120 or me at (949) 499-4555.

Very truly yours,

South Coast Water District

Michael P. Dunbar
General Manager

Mailing Address: P.O. Box 30205, Laguna Niguel, CA 92607-0205

Street Address: 31592 West Street, Laguna Beach, CA 92651

Fax: (949) 499-4256

Phone: (949) 499-4555

Appendix F
Public Hearing Notice

.AFFIDAVIT OF PUBLICATION

STATE OF CALIFORNIA,)
) ss.
County of Orange)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of **The Orange County Register**, a newspaper of general circulation, published in the city of Santa Ana, County of Orange, and which newspaper has been adjudged to be a newspaper of general circulation by the Superior Court of the County of Orange, State of California, under the date of 1/18/52, Case No. A-21046, that the notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

May 12, 2011

"I certify (or declare) under the penalty of perjury under the laws of the State of California that the foregoing is true and correct":

Executed at Santa Ana, Orange County, California, on

Date: May 12, 2011


Signature

**The Orange County Register
625 N. Grand Ave.
Santa Ana, CA 92701
(714) 796-7000 ext. 2209**

PROOF OF PUBLICATION

Proof of Publication of

Legal Notice
SOUTH COAST WATER DISTRICT
PUBLIC INVITED TO COMMENT ON SOUTH COAST WATER DISTRICT'S LONG-TERM WATER PLAN

Members of the public are invited to comment on South Coast Water District's Draft 2010 Urban Water Management Plan, which outlines how the District will provide customers with a reliable supply of drinking water for the next 30 years. The state requires the District to update this plan every five years.

The Draft Plan is available for review on the District's website at www.scwd.org and at the District's Administrative office, 31592 West Street, Laguna Beach, California between the hours of 7:00 am and 6:00 pm Monday through Thursday.

The District is accepting public comments through Thursday, June 23, 5:00 pm, via email to custservice@scwd.org or in writing to South Coast Water District, P. O. Box 30205, Laguna Niguel, CA 92607.

The public is also invited to make comments in person at the following meetings where the District's water plan will be discussed:

- Engineering & Operations Committee Meeting, Monday, June 6, 2011 at 1:00 pm at the District office, 31592 West Street, Laguna Beach, CA.
- Board of Directors Meeting, Thursday, June 23, 2011 at 6:00 pm at the Dana Point Council Chamber, 33282 Golden Lantern, Dana Point, CA.

For more information about viewing the plan or providing comments, call 949-499-4555.

Publish: Orange County Register May 11, 2011 R-749

AFFIDAVIT OF PUBLICATION

STATE OF CALIFORNIA,)
) ss.
County of Orange)

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of **The Orange County Register**, a newspaper of general circulation, published in the city of Santa Ana, County of Orange, and which newspaper has been adjudged to be a newspaper of general circulation by the Superior Court of the County of Orange, State of California, under the date of 1/18/52, Case No. A-21046, that the notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

June 2, 9, 2011

"I certify (or declare) under the penalty of perjury under the laws of the State of California that the foregoing is true and correct":

Executed at Santa Ana, Orange County,
California, on

Date: June 9, 2011

Julie Grannell
Signature

The Orange County Register
625 N. Grand Ave.
Santa Ana, CA 92701
(714) 796-7000 ext. 2209

PROOF OF PUBLICATION

Proof of Publication of

Legal Notice

SOUTH COAST WATER DISTRICT

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN of a Public Hearing to hear all objections or protests, if any, to the Draft Urban Water Management Plan (Plan). The Plan outlines how South Coast Water District (SCWD) will provide customers with a reliable supply of drinking water for the next 30 years.

The public hearing is scheduled for Thursday, June 23, at 6:00 pm or as soon as possible thereafter at the Dana Point Council Chambers, 33282 Golden Lantern, Dana Point, California. The Draft Plan is available for review on the District's website at www.scdw.org and at the District's Administrative office, 31592 West Street, Laguna Beach, California between the hours of 7:00 am and 6:00 pm Monday through Thursday.

Michael P. Dunbar, Secretary

Publish: Orange County Register
June 2, 2011 and June 9, 2011 R-804 9369892

Appendix G
Copy of Plan Adoption

SOUTH COAST WATER DISTRICT

RESOLUTION NO. 14-10/11

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE SOUTH COAST WATER DISTRICT ADOPTING AND DIRECTING FILING OF THE SOUTH COAST WATER DISTRICT REVISED 2010 URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Legislature enacted the Urban Water Management Planning Act in 1984 (the "Act"), which mandates that every urban water supplier of water providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

WHEREAS, the Act requires the Plan will be reviewed at least once every five years, and that the urban water supplier shall make any amendments or changes to its Plan which are indicated by the review; and,

WHEREAS, the District is an urban supplier of water with obligations under the Act, and has prepared for public review a Draft Urban Water Management Plan Update, in compliance with the requirements of Water Code Section 10642, and properly noticed a public hearing regarding said amended Plan Update for consideration by the Board of Directors on June 23, 2011; and

WHEREAS, public comments on the Plan having been made and considered; and

NOW, THEREFORE, the Board of Directors of South Coast Water District does hereby resolve as follows:

Section 1: The Revised 2010 Urban Water Management Plan update of June 23, 2011 is hereby adopted and ordered filed with the Board Secretary.

Section 2: The General Manager is hereby authorized and directed to file the amended Plan with the California Department of Water Resources within thirty (30) days after this date, in accordance with Water Code Section 10645.

Section 3: The General Manager is hereby authorized and directed to implement the Water Conservation Program consistent with the Urban Water Management Plan.


President

Michael P. Dunbar
Secretary

CERTIFICATION

I, Michael P. Dunbar, Secretary of the South Coast Water District, Orange County, California, do hereby certify that the foregoing **Resolution No. 14-10/11** was duly adopted at a Regular meeting of the Governing Board of said District, held on the 23rd day of June, 2011, by the following vote of members of the Board:

AYES: Gardner, McGuire, Moore, Rayfield, Runge

NOES:

ABSENT:

ABSTAIN:

I further certify that Wayne Rayfield, as President, and Michael P. Dunbar, as Secretary, signed and approved said **Resolution No. 14-10/11** on the 23rd day of June, 2011.



Michael P. Dunbar
Secretary of the Board

(District Seal)



8001 Irvine Center Drive, Suite 1100
Irvine, CA 92618
949.450.9901 Fax 949.450..9902

**MALCOLM
PIRNIE**

 **ARCADIS**

The Water Division of ARCADIS